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EDITORIAL

THE MEDICAL RESERVE.

There is an unusual activity in all three of the Federal Services, Navy, Army and Public Health, in the way of increasing the medical officers. In the Navy it is announced that there will shortly be some 300 vacancies; in the Army there are nearly a hundred and the Public Health Service has nearly fifty places open.

There was never a time when unattached physicians under 32 years of age have been offered such tempting positions. Any of the government services to-day offers a large career, with opportunity for scientific endeavor in any of the three divisions,

such as is seldom afforded outside the government laboratories. Moreover, the projects under way promise more rapid promotion than formerly and while waiting for promotion the medical officer is much better paid than the majority of men in the first five years at the practice of medicine.

The engagement of government employment in any of the branches of such public service at this time is especially favorable

Meanwhile there is a large activity in developing the Medical Reserve Corps in groups in the various States, so that every available man who wills is to be invited to join the Medical Reserve Corps. Many younger men are fearful of contracting such a relation with the government, because of the likelihood of being deprived of their growing practice and of being sent into mobilization upon unlimited terms. The experience of some M. R. C. men in the past summer has prejudiced quite a number on this account. The willingness to serve in case of real emergency, however, is the first step toward a proper organization, and if the profession generally were assured that the aim of all present effort is toward a general plan of preparedness, through the expansion of the Reserve Corps, the number of applications might be larger.

In case of actual war probably a very few medical men would refuse to serve, but if war came tomorrow they would not be particularly useful if they had no conception of the place in which they might be needed.

Already there is a good number of physicians in the list of the Medical Reserve Corps of the Army, and for two years they have had the opportunity of camp experience under government instruction. With several thousand in the M. R. C. the instruction could be more widely distributed and, in the end, there would be ready for emergency enough men to satisfy a large army need.

In the past the young, or older, medical graduate has had to drift into the Army, Navy or Public Health Service, and because of the limited number of positions in these government services there was naturally no encouragement, but the way was always made hard with the idea of both limiting the number of applicants and of selecting the best of them.

As the need of more medical officers has come about, there

should be a general consideration on the part of the profession of the larger opportunities for the young medical graduate, and they should be encouraged to go into the Medical Reserve Corps as a way toward the regular services or to active usefulness in preparedness should the occasion arise.

THE CHARITY'S NEW SUPERINTENDENT.

Dr. Stephen W. Stafford, recently elected superintendent of the Charity Hospital by its Board of Administrators, assumed the duties of the position about the middle of October.

He is a graduate of 1899 and already well known to the profession as Assistant House Surgeon of the hospital, which he served for several years, up to the time of the reorganization of the staff of that institution about four years ago. His residence in the hospital no doubt has resulted in a large experience as to the workings of the institution and has familiarized him with its needs; also, his observation of conditions and results under the "house surgeon" plan while he was a resident of the hospital and under the "superintendent" method while still one of the staff as a visiting surgeon should enable him to judge of the possible advantages and disadvantages of both systems and to cull the best from both.

We believe Dr. Stafford means to do his best for the welfare of the hospital and he cannot afford to do otherwise if his superintendency is to be a success. He needs the encouragement and assistance of the visiting staff in achieving this success and in consequence he must in return give them a square deal, and the staff is entitled to it. We urge this co-operation between the new head of the hospital and its visiting staff. It is to everyone's interest and, most important of all, it necessary for the welfare of the patients in the institution.

ON TO ATLANTA.

Every year the meeting of the Southern Medical Association grows more attractive, and the coming gathering in Atlanta on November 13 to 16 promises to eclipse all previous sessions of this rapidly-growing organization.

The secretary announces that a large atendance is promised and, with nearly 6,000 members, there should be a rousing meeting. Special trains are projected and every State in membership is already planning a record-breaking delegation.

The program is always full of good material and Atlanta is proverbially hospitable. Clinics are planned for every morning of the meeting and the incidental conferences on public health will certainly add to the features of the meeting.

While New Orleans is usually well represented, the rest of Louisiana has been a little less enthusiastic. It is to be hoped that this year both old members of the Association, as well as those who mean to join, may go in representative number to the Atlanta meeting.

The Southern Medical Association is the largest medical body in the United States after the American Medical Association, and, with its large geographic area, the membership promises to multiply greatly as the importance of the Association is demonstrated. The democratic organization, together with the lack of any politics whatever in any part of its administration, is surely calculated to develop the usefulness of this body in furthering the interests of the great South, which it wholly and effectively represents.

ORIGINAL ARTICLES

(No paper published or to be published in any other medical journal will be accepted for this department. All papers must be in the hands of the Editors on the tenth day of the month preceding that in which they are expected to appear. Reprints may be had at reasonable rates if a WRITTEN order for the same accompany the paper.)

OPERATIONS UPON THE KIDNEY AND URETER UNDER LOCAL ANESTHESIA.

By CARROLL W. ALLEN, M. D., New Orleans.

The free exposure and anesthesia of the kidney and ureter as far down as the brim of the true pelvis, can be quite satisfactorily carried out. While several methods have been suggested, including para-vertebral anesthesia, the author prefers the following plan as easier, quicker and always certain of satisfactory anesthesia. The only condition under which it can not be satisfactorily undertaken is in the presence of extensive perirenal adhesions, or complicating surrounding pathology. Under such condition local methods should not be attempted alone.

The use of the Lilienthal bridge, or sand bags, to elevate the kidney region should not be made until just at the time the kidney is ready to be delivered and then used to a less degree than under general anesthesia, as they may become very uncomfortable or even painful and cause the patient to complain or squirm about in a trying way. After the kidney is delivered, these aids may be partially or entirely removed and it is often found possible to perform the operation without them, or a satisfactory substitute may be had in a soft pillow doubled up under the lumbar region. With the patient in a comfortable position, a point midway between the last rib and crest of the ilium along the proposed line of incision is selected and an intra-dermal wheal created. A large syringe and long needle are now used. One-fourth per cent novocain or one-fifth per cent eucain solution will be found amply sufficient. The long needle is entered through the wheal and directed up subcutaneously over the last rib, injecting as the syringe is advanced as far

as the eleventh rib. The point is now slightly withdrawn and directed close under the lip of the rib and an injection made here to reach the eleventh intercostal nerve. The needle is now withdrawn almost the entire length and redirected on a slightly deeper plane—always injecting the solution as the needle is being advanced, removing the syringe from time to time for refilling. The needle is now advanced in contact with the twelfth rib. The twelfth intercostal nerve, unlike the other intercostals, leaves the rib early in its course, running obliquely away from it downward and forward, and in the position encountered here about three inches from the spine, it lies from one-half to one inch from the rib. As the needle passes this point, a slightly larger quantity of solution is injected. The needle is now almost withdrawn and redirected down close in contact with the sheath of the quadratus lumbrorum and advanced up along it for several inches, distributing the solution. By changing the direction of the needle, the aponeurosis of the abdominal muscles at the point where they fuse with the sheath of the quadratus lumborum, is sought for; this is about two to two and one-half inches from the lumbar spinous processes. This is recognized as the first plane of resistance which the needle encounters. It is penetrated at several points and a few drams of solution deposited beneath it. The needle is now directed slightly deeper into the perirenal fat and about one-half ounce of solution deposited here extending as high as a point well up under the last rib. If any uncertainty is felt in making these last deep injections, they can be omitted until the aponeurosis of the muscles is exposed and the deeper parts of the field brought closer within reach.

Having completed the above, the lower half of the area is now injected in a similar manner by drecting the needle downward from the skin wheal toward the crest of the ilium, but on a slightly anterior plane approaching the anterior portion of the iliac crest to conform to the curve of the proposed incision.

The tissues here are injected in several planes as above—the first injection being made subcutaneously. When pro-

ceeding by this method, it is unnecessary to inject the skin independently, as the subcutaneous injection has ample time to diffuse outward while making the deeper one. The operation can now be proceeded with and as it will usually be found advisable to resect the twelfth rib, this is done at once and furnishes ample room for access to the parts beneath without undue traction.

A limited amount of injecting in the deeper parts will now be all that is needed. The advantage of practically completing the injection before making the incision is obvious. With the weak solution employed ample time is allowed for thorough saturation of the tissues and only the excess escapes when the incision is made. It is also much quicker and by following a methodical plan of this kind no portion of the field is left uninjected.

After dividing the aponeurosis of the abdominal muscles and the twelfth dorsal nerve, a large branch is encountered between their planes, giving off in this position its lateral cutaneous branch.

By gently following these two trunks proximately they are seen to approach each other and join on the anterior surface of the quadratus lumborum. In the depth of the wound, they can now be injected intraneurally, which should be done as deep down as they can be ccoveniently reached. They are the principal sensory nerves of the superficial parts and their thorough anesthesia insures a painless wound.

Having freely divided the aponeurosis of the abdominal muscles, the finger is gently passed inward through the cellular tissue along the anterior surface of the quadratus lumborum muscle. This tissue is loose and easily separated, searching the way for needle, which is now advanced in this direction toward the vertebral column and a few drams of solution deposited here in the tissues underlying the hylum of the kidney. If the kidney is adherent, this injection should be more liberal than in a simple case and should be carried well in toward the psoas muscle, which is easily felt and can be seen with reaction of the tissues. This deep injection is very easily made and is of much importance should the kidney be adherent or the abdominal cavity likely to be opened,

as it controls the entire nerve supply of this portion of the cavity by blocking the sensory fibers of the rami communicantes, which run in the sympathetic chain on each side of the vertebral column.

This completes the anesthesia and no further steps of the operation need be explained here, as it can now be performed by any technic preferred; but where the kidney is to be removed, I usually make a slight additional injection along the vessels, at its hylum after the organ is exposed and before separating them from the ureter, but this injection is unnecessary if the injections close to the vertebral column have been ample.

By following this method of procedure, which is the gradual evolution of much clinical experience, I have frequently removed kidneys or freely opened them along their entire length down to the pelvis in removing calculi. In one case of polycystic kidney, which was considerably larger than a man's head, filling the entire right side of the abdominal cavity and badly adherent, the organ was separated from its adhesions and the cysts ruptured, reducing the kidney to about normal size, without any discomfort on the part of the patient.

The thorough anesthesia, which permits such muscular relaxation, often makes the use of retractors superfluous and the use of kidney pads of the Lilienthal bridge unnecessary.

Operations upon the ureter are similarly performed, omitting the deep anesthesia toward the vertebral column and anesthetizing only the cellular tissue along the recognized course of this organ. By carrying this anesthesia to a lower level and dividing the abdominal muscles at their attachment to the iliac crest, the ureter can be easily followed as far down as the brim of the true pelvis. Beyond this point local methods are not feasible. As the ureter descends, it approaches the peritoneum and is adherent to it throughout the lower part of its course and is easily found in this position, as these tissues are separated from the posterior abdominal wall. High up in its course, the ureter is best located by following it down from the kidney.

Perinephritic abscess requires no special technic, but can be readily opened by infiltrating the several planes of tissue

which overlie it. As any pressure excites pain, the infiltrating should be gently and slowly proceeded with, using slightly stronge solutions than advocated above, at least one-half percent of novocain.

DR. CARLOS J. FINLAY'S POSITIVE CASES OF EXPERIMENTAL YELLOW FEVER.

By C. E. FINLAY, M. D., of Havana, Cuba.

In the July issue of THE NEW ORLEANS MEDICAL AND SUGICAL JOURNAL is published a most touching biographical sketch of my late father, Dr. Carlos J. Finlay, by Dr. Aristides Agramonte, his co-worker in the field of yellow fever etiology, which is pregnant with warm friendship and admiration which he felt toward him and in which he depicts in vivid colors the tremendous uphill fight he had to wage for 21 years before obtaining scientific recognition of his theory of transmission of yellow fever by means of the mosquito (*Stegomyia calopus*).

In this article there appears, however, a statement in reference to the cases which my father had reported as "positive" of "experimental yellow fever" to which I must take exception, viz: That they "were certainly negative (we now know they must have so resulted, inasmuch as his mosquitoes had not sufficiently incubated and were not infective when applied").

This paper has for its object a defense of the positive nature of these cases, a point which has a much greater importance than the secondary one of priority in the production of experimental yellow fever, since if cases be accepted as "positive" it entails the possibility of transmission of yellow fever, even though it occur exceptionally, after a shorter incubation than the classical twelve days now held, which must be taken into account in the carrying out of prophylactic measures, especially at this moment when the Rockefeller Commission has undertaken the "magnum opus" of studying the measures requisite for eradicating from the surface of the earth that terrible scourge which, even today, levies such a heavy toll from the population of tropical lands.

There is no question but that the brilliant results of the United States Army Yellow Fever Board were much more convincing than those which my father had previously obtained with the more or less primitive means at his disposal, but this does not justify

the conclusion that his positive cases were negative on purely conjectural grounds and without going into the circumstances that surrounded them.

Before going further, I think it expedient to consider the different objectives pursued by the Army Board and by my father, which in a great measure explain the difference in the results obtained. The board's objective was purely scientific, their purpose being mainly the production of clear cases of experimental yellow fever, running the risk of production of a severe or even a fatal case of the disease in consideration of the great benefit to be derived by humanity by a clear demonstration of its means of transmission; my father, on the other hand, only aimed at the production of a mild case, surrounding his experimental cases with a number of precautions to prevent the production of a severe case, this mild attack guaranteeing the inoculated person from a future attack of possibly severe or fatal yellow fever. In this he was inspired by perhaps somewhat exaggerated scruples and by the fact that he was conducting his experimentation on entirely original lines, individually and with no official backing. He realized perfectly that by applying more than one mosquito and by allowing more time to elapse between the stinging of the infecting and the inoculated case, he would be more certain of producing a positive case, but was deterred by the danger. Thus in a paper, written in 1891 and reproduced by Dr. Guiteras in the *Revista de Medicina Tropical*[2], we find the following paragraph:

> By the term "contaminated mosquito" I understand such as have stung a yellow fever patient during the first six days of the disease, and it is my belief that whereas one or two stings from mosquitoes recently contaminated may either occasion in susceptible persons a mild attack or simply confer immunity without any pathogenic manifestations, a severe attack would result from **a greater number of stings** and the same might also occur in consequence of a single sting from a mosquito that should have fed on sweet juices during several days or weeks after its contamination, before it is allowed to sting another non-immune subject. In this case the germs have had time to develop more abundantly, not having been wiped off in the interval, and the virulence of the infection might be expected to be proportionately increased.

And again in a paper written in 1898[3] we find the following:

> It is therefore, quite admissible that, when the mosquito becomes contaminated, not only its eggs but also its salivary and venom glands may be invaded by the pathogenous germs, so that the latter may be discharged with the secretions of those glands along the track of the wound, and into some capillary vessel entered by the sting when the insect attacks its next victim. Indeed on some rare occasions, I have seen mosquitoes die within twenty four hours after they have stung a severe case of yellow fever without any assignable cause, for they still retained some of the blood which they had sucked; whence it may be surmised that the yellow fever germ is pathogenic for the Havana mosquitoes though the infection seldom proves fatal for those insects.

After these preliminaries, I will proceed to deal with:

1. The results of my father's yellow fever inoculations.

2. The objections presented against the admission of my father's positive cases.

3. A criticism of these objections.

4. A study of the circumstances which may permit the transmission of yellow fever by a mosquito with a relative short incubation.

5. The conclusion to be drawn from the data brought forward.

1. Dr. Carlos J. Finlay's Yellow Fever Inoculations.

These are detailed in a long series of papers[4], the last one dealing with them being published in 1904[5]. In this we find the tabulated report of 102 cases inoculated by him with mosquitoes, all with a short incubation, in these he obtained positive results in 11 cases, a doubtful result in 3 and negative ones in 89; in a majority of the latter he claimed to have produced immunity. In all these cases he attempted to avoid any outside causes of infection, but in the greater number it was impossible to exclude absolutely the possibility of such an occurrence, although the consideration of all of them as coincidences seems a little strained. There are, however, four cases where such an outside source of infection can be rigidly excluded from a strictly scientific standpoint: these are reported in detail in some of his earlier papers[6]; I will summarize the results of three of them in his own words[7]:

My first inoculations by means of mosquitoes were performed under the following circumstances: A group of unacclimated soldiers who were quartered on the heights of the Cabanas, on the other side of the bay, were picked out for observation, and were only allowed to cross the bay in batches of four or five, on the days they were sent to my office, where I tried their blood for hematimetric purposes. Five of the group were inoculated by me at different dates between the 29th of June and the end of August, 1881. The first three were followed at the end of five to fourteen days incubation by an attack of fever of several days duration, diagnosticated by the attending physicians at the military hospital as "regular yellow fever" in the first case, and "abortive yellow fever" in the two others. The fourth inoculated soldier suffered only from continued headache, and on the fifteenth day after the inoculation came to my office with slight fever (temperature 100.7 degrees F., pulse 100), but was not laid up. The fifth did not return to my office. I was informed that he had felt poorly a few days after the inoculation, but was not laid up. I have been able to trace the history of these five cases until the beginning of last year (1885). None of them have been reported, up to that date, as subsequently attacked by yellow fever. Of the remaining fifteen soldiers of the group, upon which the inoculation was not performed, none were attacked with yellow fever during the period of my observation, June 28 to September, 1881.

Can the attack of "regular yellow fever" in one of these cases and "abortive yellow fever" in two others and subsequent immunity during a period of four years, although they lived in a yellow fever focus, and the freedom from yellow fever, during the period of observation, of the remaining fifteen non-inoculated soldiers who lived in the same barracks and under exactly the same conditions, be considered a coincidence?

The fourth case is still more convincing and is reported in detail in both the publications referred to above. The experiment was performed at a pleasure farm owned by the Jesuit Fathers, where they sent their non-immune members during the hot summer months. It was situated outside the regular thoroughfares at a place called "Los Quemados," at Marianao, some nine kilometers from Havana. The only way to reach it was by a flag-station on the Marianao Railroad, the distance from which to the

farm was about one kilometer across fields; this place was alluded to by Dr. Stanford E. Chaillé in his Report of the Yellow Fever Commission that visited Havana in 1879[6], and it was on this same farm where, years later, the United States Army Yellow Fever Board established their "Lazear Camp." During the 11 years which this farm had been in possession of the Jesuits, prior to the inoculation I am about to refer to, not a single case of yellow fever had developed there, so that it could be considered as free from yellow fever at the time the experiment was performed. The subject experimented upon was Rev. E. Urra, S. J.; he was transferred to the farm and kept there for three weeks under strict observation without developing any symptoms of disease. On July 15, 1883, he was inoculated by a mosquito which had bitten a yellow fever patient in his seventh day, this inoculation proving negative. After a month's time, during which he was not allowed to come to the city, he was inoculated on August 17, 1883, by a mosquito which had stung two and four days previously two severe cases of yellow fever, both in the sixth day of the disease. Nine days later Father Urra fell sick, developing a typical case of yellow fever. None of the other non-immunes, who were stopping at the farm, contracted the disease and Father Urra, who still lives in Havana, never suffered from another attack of yellow fever[9].

Can any theoretical grounds suffice to disqualify this last positive case? Do not the circumstances surrounding it exclude any outside sources of infection as rigidly as in the cases of the Army Board? If the source of infection of this case was not the mosquito that stung him would not some of the other non-immunes staying then at the farm have also fallen ill with yellow fever?

II. Objections to the admission of these cases as "positive" ones of Experimental Yellow Fever, advanced on different occasions by Drs. Reed, Carroll and Agramonte[10]

These objections are of two orders: (a) That according to the present scientific census of opinion, yellow fever must be considered of the same nature as malaria; that its germ or parasite requires to evolve a certain cycle of its existence in the mosquito and another in man; that the duration of the mosquito cycle is at least twelve days, before which time the parasite is not infective to man, and as in my father's positive cases the sub-

jects were stung by mosquitoes two to six days only after their contamination, these could not have produced the disease in these cases. (b) That the experiments of the United States Army Medical Yellow Fever Board and subsequent observers all tend to prove that the infected mosquito is not infecting till after the twelfth day, all their experiments with mosquitoes incubated for less time having proved negative.

III. Criticism of These Objections.

My father, Dr. Carlos J. Finlay, was among the first to accept the similarity of the biological process of the parasite of yellow fever with that of the malaria parasite; even before the experiments of the Army Board he had mentioned that he considered the parasite of yellow fever as pathogenic for the Havana mosquito[11], and there is no question of the existence of this similarity, but, from that, to conclude that the process is identical in the two parasites and that consequently my father's "positive cases" could not have been produced by the mosquitoes with which he stung them is an entirely different proposition; rather must we adapt our theories to "facts" than these to any theory no matter how plausible. Nothing is known of the yellow fever parasite, we surmise it is a protozoon of the malaria type, small enough to pass through a Berkfeld filter, hence it is rash to fix the different incubation periods within such hard-fast limits; even with such a thoroughly-studied parasite as that of malaria we find great variations pointed out in the duration of the incubation period in the mosquito[12]. Moreover, the biological process shows a marked difference in the two diseases in one important particular to which my father called attention in 1903[13], and that is that:

> While the human subject is rightly held to be the 'permanent host' of the malaria parasite, it is the stegomyia mosquito and not the human subject that acts the part of 'permanent host' for the yellow fever parasite. The short sojourn of this germ in the human body being only such as might be expected of a parasite going through the phases of sexual reproduction in the body of its 'intermediate host.'

In malaria, the infective period in man is practically unlimited, whilst in yellow fever the infective period in man is limited to the first four days, according to the Army Board, and first six days,

according to my father. The reverse takes place as regards the mosquito for, whilst in malaria it is only infecting for a short time, in yellow fever once infecting it continues to be so during the remainder of its lifetime, being more and more so as time passes on. On this last point the board and my father agree in every respect, where they differ is in how much time must elapse before the infected mosquito becomes infecting.

Another point, in connection with this part of the subject, is the transmission of yellow fever by direct injection of blood serum extracted from a yellow fever patient in the first three days of the disease, the possibility of which was proved by the Army Board, by the French Commission, etc.[14], there is in this line an instructive experiment performed by Carrol [15], in which the blood of a mild case of yellow fever was kept overnight, for fourteen hours before its injection into the experimented subject, the result of the inoculation being positive. Taking this into consideration, my father pointed out that there is a possibility of the mosquito under certain circumstances performing this blood-to-blood transmission and thus producing yellow fever in a different manner from the usual process[16].

Let us now pass to consider the experiments of the United States Army Yellow Fever Board and subsequent observers as tending to prove that mosquitoes infected with a yellow fever case are not infecting till after the twelfth day. The experiments of the Army Board are reported in two communications: (1 A Prelimnary Report, read at the meeting of the American Public Health Association at Indianapolis, Ind., October 22-26, 1900, and (2) An Additional Note, read at the Third Pan-American Congress, Havana, 1901. In the former we find reported nine negative results with mosquitoes which had incubated less than twelve days, in one of these (Case 1) the infecting case was in its seventh day and my father had already observed that after the sixth day yellow fever was not infecting, leaving us eight negative results. On the other hand, we find, in connection with the two positive cases of the group, that one (Case 10) was stung with a mosquito which had stung a yellow fever case twelve days before, but the same mosquito had also stung yellow fever cases six, four and two days before, and the other (Case 11) was stung by four mosquitoes, two of which had bitten yellow fever cases twelve

days previously, one sixteen days before and the fourth eight days before; the two first mosquitoes had, however, also stung yellow fever cases two, four and ten days before being applied to the subject experiemented upon; the third mosquito had also bitten yellow fever cases two, four, six and eight days previously. In these cases, although it is probable ahat the infection arose from the longer incubated bite, the shorter incubated ones cannot be excluded with certainty nor the statement made that all the experiments with mosquitoes incubated for less than twelve days were negative, since there is a *possibility* that these cases may have arisen from some of the more recent bites. In the further experiments performed by the Army Board, reported in the second paper, very few were performed with mosquitoes which had incubated for a short time. Case 1, where a negative result was obtained by the biting of the subject (twice) with a mosquito which had bitten a yellow fever case eleven days, another case six days before and a third case three days before the first inoculation and two more days before the second, gave a negative result; this case later proved positive when inoculated with five mosquitoes that had incubated from fifteen to twenty-one days; and Case 7 (the infected tent case) which gave a positive result, the fifteen infecting mosquitoes having incubated:

One for twentyfour days; three for twelve days; four for eight days; seven for five days.

In this experiment one cannot eliminate one set of mosquitoes from the other. As regards the positive results obtained with long-incubated mosquitoes, it is instructive to point out that four prior attempts had given negative results although the mosquitoes applied had incubated for eleven, fifteen, seventeen and eighteen days[17], which shows that the negative results may depend on other causes than too short an incubation.

We come next to Dr. Guiteras' experiments at the inoculation station of Las Animas Hospital[18]. We find five experiments with mosquitoes with a short incubation (less than twelve days). One of these (experiment 3) is noted in the table of inoculations as "doubtful insect"; another (experiment 13) was inoculated posteriorly four times with a similar negative result[19] with mosquitoes which had incubated eleven, twenty-three and twenty days,

respectively, a positive result not having been obtained[20] till the sixth inoculation with a twenty-four-day incubated mosquito, denoting a great individual resistance to the infection; another case (experiment 16) had been inoculated before with seventeen and twenty-five-day incubated mosquitoes [21] and posteriorly with insects which had incubated for sixteen and twenty-four days[22] with likewise negative results results, a positive result not being obtained till the sixth inoculation[23]; in the other two (experiments 17 and 26) only a single experiment was performed with mosquitoes which had incubated for seven and five days. In the remainder of the experiments we find eight positive and twenty-nine negative results. This whole series shows an extraordinary number of negative results, to which Dr. Guiteras himself calls attention, attributing them to the mildness of the cases from which the first twenty-five experiments were inoculated to the season of the year, to variations in the number of parasites in the peripheral circulation.

Other subsequent investigators[24] have made no experiments with mosquitoes incubated for a short time, so that their experiments have no bearing with the point at issue.

The only deduction that can be drawn from these data is that the transmission of yellow fever by the infected mosquito is much easier after a certain number of days have elapsed, a fact which my father had surmised since 1891[25], not having put it into practice on account of his exaggerated fears of producing a severe attack[26] of the disease or even death[27]. But from these few negative results, setting aside the doubtful positive result obtained in three cases, and in connection with a parasite about the biological details of whose life history we are so utterly in the dark, to conclude that under no circumstances an infected mosquito can transmit the disease under the rigid limit of twelve days is unwarranted; much less are we justified on these purely hypothetical premises in disqualifying all my father's positive cases even where surrounded by the circumstances referred to in connection with the four cases mentioned in the early part of this paper.

IV. Circumstances Which Might Permit the Transmission of Yellow Fever by Means of a Shortly Incubated Mosquito.

There is nothing in the acceptance of my father's cases as

"positive" which affects the "host" theory of the trasmission of yellow fever by the mosquito so beautifully evolved and proved experimentally by the Army Board, there are a number of explanations which can be given for the exceptional occurrence of these early incubated cases, it not being possible to determine which is the correct one till the parasite and the biological details of its life history are known.

In the first place, it is possible that under certain circumstances of temperature, atmospheric conditions or some accidental circumstances in the mosquito its salivary glands become infected at an earlier date than seems to be usually the case. This is all the more feasible if my father's theory that the asexual portion of the life of the parasite takes place in the mosquito be accepted, the multiplication in the body of the mosquito in that case taking place by schizogonia and the infection of the bitten man being due on one hand to the number of germs introduced into his body, which is greater and greater as time goes on, and on the other to the susceptibility of the bitten subject, a small number of parasites in a susceptible subject being more likely to produce an attack of illness than a large number in non-susceptible, partially or totally immune one.

Another explanation is that in the cases of short incubation the process of transmission is not the usual one, but must be considered as a direct blood-to-blood transmission, the moquito in this case not acting as a "host," but simply as a receptacle for the blood. This possibility was called attention to by my father in 1901[28].

All this is, however, purely hypothetical, and when the parasite is discovered some entirely different explanation may be forthcoming.

The only conclusion that can be drawn from the foregoing is that:

In the present light of medical science there are no grounds for rejecting the cases of experimental yellow fever reported as positive by the late Dr. Carlos J. Finlay in general and in the cases referred to in this paper in particular, and that in consequence the possibility of the occurrence, even if it happen exceptionally, of cases after a short mosquito incubation should not be lost sight of.

Before leaving the subject and in connection with the relation between the admirable experimental work and accurate technic of the Army Board, which not only confirmed my father's Theory of Yellow Fever Transmission, but also evolved the "host" theory of the evolution of its parasite and my father's *previous work with cruder and less perfect methods,* I will quote the following phrase from a speech he pronounced at a dinner in his honor given by the physicians of Havana presided over by General Wood on December 22, 1900, on the occasion of the confirmation of his theory by the United States Army Yellow Fever Board:

> Twenty years ago, guided by indications, which I deemed certain, I sallied forth into an arid and unknown field; I discovered therein a stone, rough in appearance, I picked it up and with the assistance of my efficient and faithful colaborer—Dr. Claudio Delgado, polished and examined it carefully, arriving at the conclusion that we had discovered a rough diamond. But nobody would believe us, till years later there arrived a commission, composed of intelligent men, experts in the required kind of work, who in a short time extracted from the rough shell the stone to whose brilliancy none can now be blind.

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FINLAY AND DELGADO'S EXPERIMENTAL YELLOW FEVER.

(A REPLY TO DR. C. E. FINLAY).

By ARISTIDES AGRAMONTE, M. D., Sc. D., Havana, Cuba.

The question whether, during their original investigations and in their futile attempts to demonstrate the transmission of yellow fever by the stings of mosquitoes, the late Drs. Finlay and Delgado were enabled to produce a case or not can be of but secondary importance now, inasmuch as failure to convince anyone was unfortunately the outcome of twenty years' labor, in presenting to the scientific world the more or less exact data at their command and the reasoning upon which Dr. Carlos J. Finlay based his theory.

But I am compelled to treat upon the matter, since Dr. C. E. Finlay, referring to my paper in the JOURNAL of July, 1916, takes exception to my statement therein that none of his father's so-called experimental cases can be accepted as positive yellow fever, and essays to defend his position by considering as the most forceful the two least weighty arguments that have been put forth in support of the contrary opinion at the same time that he misquotes his father's published tables and results.

I have not seen published that any authority, aside from the late Dr. Finlay himself, accepted or recognized the authenticity of the cases of yellow fever which he claimed to have produced in collaboration with Dr. Delgado; had such acceptance been accorded by any investigator, had any of their supposed demonstrations "held water," Finlay's theory would have been certainly proved many years before the United States Army Board took up the investigation.

The fundamental truth (the fact that mosquitoes transmit the infection), as conceived by Finlay, was so wrapped up in a mass of errors, hypotheses and speculations in his original contributions, that it remained hidden from the eyes of science until the subject received a thorough overhauling at the hands of the United States Army Board, when at last the grain was threshed out from the chaff; Finlay and Delgado's experimental cases formed part of the chaff.

The following table is extracted from the original article in "Selected Papers" (p. 497), being misquoted by Dr. C. E. Finlay;

it shows how his father claimed, not *eleven*, but *sixteen* positive results; there were *eighty-six* (not *eighty-nine*) failures, the doubtful cases mentioned not appearing there.

		Source of Mosquito's Contamination.				Result in First Twenty-five Days.		
Serial number on Table.	Date of inoculation.	No. of mosquitoes	Day of the disease.	Character of the disease.	Days after contamination	Date of onset.	Period of incubation	Character of the resulting attack.
1	30, Jun. 81	1	4th	Hemogastric	2	14, July	14 days	Albuminuric p. f.
2	22, Jul. 81	1	5th	Albuminuric	6	27, July	5 days	Abortive; one febrile paroxysm and no albuminuria.
4	31, Jul. 81	1	3rd	Hemogastric	2	5, Aug.	5 days	Abortive, same as above.
5	2, Aug. 81	1	5th	Hemogastric	3	17, Aug.	15 days	Ephemeral fever, without well defined characters.
8	22, Jun. 83	2	6th	Hemogastric	2	9, July	17 days	Non-albuminuric of mod. intensity.
9	15, Jul. 83	1	7th	Albuminuric	2			
	17, Aug. 83	1	5th	Hemogastric	2 & 4	26, Aug.	9 days	Non-albuminuric of mod. intensity.
13	16, Jul. 83	1	7th	Albuminuric	2 & 4			
	18, Aug. 83	2	5th	Hemogastric	2	9, Sept.	22 days	Yellow fever with traces of albumin.
28	7, Sept. 86	1	?	? ?	6 & 4	23, Sept.	16 days	Non-albuminuric of mod. intensity.
32	16, Jun. 87	2	6th	Hemogastric	2	11, July	25 days	Yellow fever with traces of albumin.
42	8, Jun. 88	1	4th	Hemogastric	3	1, July	22 days	Non,albuminuric of mod. intensity.
55	17, Aug. 89	1	4th	Albuminuric	3	26, Aug.	9 days	Abortive; one febrile paroxysm with albuminuria.
66	14, Aug. 90	1	4th	Albuminuric	3	21, Aug.	7 days	Abortive; same as above.
80	17, May 93	1	4th	Albuminuric	2	22, May	5 days	Ephemeral fever, without well defined characters.
82	28, May 93	1	3rd	Hemogastric	2	11, June	14 days	Ephemeral fever; same as above.
84	12, Aug. 93	1	5th	Hemogastric	3	17, Aug.	5 days	Non-albuminuric of mod. intensity.
90	6, June 94	2	4th	Hemogastric	3	22, June	16 days	Abortive: one febrile paroxysm with albuminuria.

Extract from Finlay-Delgado's Table. (Selected Papers, p. 497).

It may be well to note that, as acknowledged by my colleague, in the greater number of the cases inoculated "it was impossible to exclude absolutely the possibility of outside infection." Note also that the claim to have produced immunity in the majority of the eighty-six failures rests upon the information obtained that the men experimented upon never afterwards developed yellow fever; but it is curious enough, as will be detailed later, that

some of the so-called positive cases suffered from a subsequent attack of the disease, and we are logically led to infer that cases which resisted the experimental inoculations became immune thereby, while some of those who suffered the experimental infection, presumably thus showing that they were susceptible and who ought to have become immune, actually suffered another attack, and in one instance *two attacks,* of the disease. This rather astounding record, naturally, was not touched upon by Dr. C. E. Finlay:

Dr. C. E. Finlay has been good enough to admit that most of the cases are open to criticism, but that out of the *sixteen* (not *eleven*), supposed to have resulted positively, four of them, in which the "outside source of infection can be rigidly excluded from a scientific standpoint," ought to be accepted as true experimental yellow fever.

Let us examine them in the order presented.

The first three supposed positive cases, Nos. 1, 2 and 4, of the Finlay-Delgado Table, were attempted upon soldiers (Spanish), who were quartered at Cabana's Heights, across Havana Bay, and came to the city, says Dr. Finlay, Sr., "on "the days they were sent to my office where I tried their blood for hematemetric purposes." Now, since the city of Havana, as everybody knows, was a pest-holt of yellow fever at the time, can outside infection be excluded from such men, who regularly came into it, so as to visit the doctor's office? How often did they come? Did these soldiers go nowhere else before or after the call at the doctor's? From a scientific standpoint, outside infection cannot be excluded and the experiment as carried out upon these three men certainly cannot be considered as worthy of much credit.

Case No. 1, diagnosed by the attending physician at the military camp as "regular yellow fever," according to Dr. Finlay's record, came down with the disease *fourteen* days after the experimental inoculation (June 30th to July 14th, 1881). I hardly think it necessary to go very extensively into an analysis of this case; a period of incubation extending to twice the length of time recognized by all authorities as the usual one in yellow fever is enough to throw the case out from the group of the so-called positive results and when we remember that the man came

to Havana now and then it seems more logical to assume that he became infected in one of those trips, subsequent to his inoculation, than to suppose an exceptional incubation period of fourteen days, in his particular case. It will not be thought strange to find such great error at the commencement of Dr. Finlay's experiments when we observe, by the table above referred to, that he was willing to grant a possible period of incubation to his experimental cases extending even to twenty-five days. The length of time that elapses from the moment of infection until the appearance of the first symptoms has been a subject of discussion since the earliest investigations of this disease; the work of Carter, as well as the experimental data that has accumulated (with which I do not wish to burden this brief reply), have definitely allowed sanitarians to agree, and it is the consensus of opinion, that it can only exceptionally extend beyond the seventh day and certainly no one should contend, unless he present experimental demonstrations to that effect, that a period of incubation of nine or more days in yellow fever is at all probable. For quarantine purposes, six days of observation from the moment of possible infection has been considered sufficient to safeguard a community.

The next question is, did they have yellow fever?

Cases Nos. 2 and 4, the other two soldiers, according to the military surgeon's diagnosis, suffered an attack of "abortive yellow fever without albuminuria." Really, anything at all may be called an "abortive" attack of any infection, where the infective organism is unknown; a single febrile paroxysm without albuminuria, or any other symptom, occurring in a soldier, might be due to innumerable causes, certainly not yellow fever. In the cases mentioned there is no record that all these other causes had been eliminated; too quick to see here a positive experimental case they probably were not even considered. Dr. Finlay himself did not make the diagnosis in those cases of "abortive" fever; had he done so, perhaps I might be tempted to accept it, knowing his familiarity with the disease (trusting to his "clinical eye"); for this additional reason we cannot accept the surgeon's diagnosis, based upon such meager evidence as "one non-albuminurial febrile paroxysm." There is nothing, absolutely nothing, to show that these two cases (from which outside infection cannot be ex-

cluded) had yellow fever, and only an exalted enthusiasm, such as naturally inspired Dr. Finlay at the time, could have misled his good judgment in accepting them and placing them upon record.

The fact that these three men (cases Nos. 1, 2 and 4) did not suffer from yellow fever for some time afterwards cannot be used as an argument in favor of the positive character of their illness, for, as Dr. Finlay himself reports, "of the remaining fifteen soldiers of the group upon which the inoculation was not performed none were attacked with yellow fever during the period of my observation, June 28 to September, 1881." Far from its being a conincidence I consider this the natural course of events, inasmuch as the period of observation was too short, and that instead of proofs of exposure to infection, it is claimed that Cabana's Heights was a perfectly safe harbor.

The fourth and last case that Dr. C. E. Finlay thinks beyond question is still easier to set aside as certainly negative. It corresponds to case No. 9 in the Finlay-Delgado Table.

Let us presume, for there is no conclusive evidence to prove it, that the man as well as his companions had been surrounded by every safeguard to prevent their infection with yellow fever. I personally believe this was unnecessary and that none of them had yellow fever at all. On July 15 (1883) a supposedly contaminated mosquito is applied to Father Urra; no infection followed, naturally; on August 17 two other insects are allowed to sting him; then, after *nine* days the man suffers from a "non-albuminuric yellow fever of moderate intensity." With due respect for Dr. C. E. Finlay's opinion, I must say that for an experimental case this could hardly be less *typical;* in the first place, we have again the onset occurring beyond the usual recognized and "official" period of incubation; had the circumstances been otherwise I am sure that the appearance of non-albuminuric symptoms nine days after inoculation would have been ascribed to any other cause than the mosquitoes' stings; yet I appreciate the personal equation in this case, as well as in the others, the natural optimism of the investigator who, believing in the possibility of a *twenty-five-day period of incubation,* was more ready to admit a shorter one of nine days; but no modern physician conversant with yellow fever can so accept it.

In the second place, the identity of the disease may be questioned with good reason. At any rate, a non-albuminuric case of yellow fever is a rara avis; only during active epidemics, when other diagnosis cannot be made, dare we arrive to such a conclusion and that, mainly, by exclusion; but when it reaches a "moderate intensity" albuminuria is sure to be present. The frequency with which the late Dr. Finlay claims to have seen such cases previous to the United States Army Board's investigations and the fact that we never saw them afterwards leads me to think that he was prone to put too much faith upon non-albuminuric fever being yellow fever. The other prominent symptoms of yellow fever (fever, jaundice, vomiting) may well belong to other conditions. As may be seen by the table, any typical form of the disease seems to have been a pretty constant feature of Dr. Finlay's experimental cases. I offer as a further proof that Father Urra did not not have yellow fever the fact that the other priests living with him under the same conditions did not subsequently suffer an attack of the disease, for nowhere is it reported that any precautions were taken to protect him or his companions from the stings of mosquitoes or to destroy insects which might have been contaminated by him. In the natural desire to claim success these arguments are lost sight of and it seems too late now to assume that other measures were adopted than those heretofore recorded. Experience has shown that a case of yellow fever in a community such as the suburbs of a Cuban city, where no precautions had been taken to eliminate the stegomyia mosquito or to decrease its numbers, was sure to bring about an epidemic. Although the same neighborhood was used by the United States Army Board for our experiments, our men were kept isolated in tents, slept under moquito bars, their temperatures taken at regular intervals and, as soon as the first sign of infection was noticed, they were taken away from there to the yellow fever hospital, more than a mile distant, so that they were not allowed to infect the camp at any time; if any of these precautions were taken in the case of Father Urra they are still to be reported, and to establish comparison between that case, a tardy and questionable infection, and with the Army Board's conclusive results seems to me entirely out of reason.

In briefly outlining the most salient objections to the authen-

ticity of Finlay and Delgado's experimental infections with yellow fever I have purposely left out of consideration the only two arguments that Dr. C. E. Finlay thinks have been opposed to his father's claims, (*a*) the period of the disease at which the insect can become contaminated and (*b*) the time at which the insect becomes infective. Much might be written in support of them, but I wanted to show that the so-called experimental cases of Finlay and Delgado could be thrown out upon the most cursory examination by anyone who is at all familiar with the etiology and pathology of yellow fever. The late Dr. Finlay always held the same views as expounded by his son today, but he never proved his contention, although his official position and the elements at his command for several years could have enabled him to demonstrate that mosquitoes became contaminated and infective as early as he supposed.

If the above were not sufficient reasons to cast serious doubt upon the experiments as reported, I wish to point out that in Finlay and Delgado's original table (Selected Papers, p. 497) there is a column headed "subsequent yellow fever" (*fiebre amarilla ulterior*), in which it appears that

Case No. 42 suffered another non-albuminuric attack of yellow fever (presumably not experimental) on November 4, 1888.

Case No. 66 suffered a second attack on July 6, 1895, "abortive with albuminuria" (five years after the experimental attack).

Case No. 80 suffered *TWO* subsequent attacks of yellow fever; one, October 18, 1893, non-albuminuric in character, and another on August 26, 1894, of the hemogastric type of yellow fever.

Case No. 90 suffered a second attack, "abortive with albuminuria," on August 18, 1895.

We have, therefore, that out of sixteen experimental cases, five of them suffered secondary attacks of the disease. Is this an argument in favor of the so-called positive results, or just the contrary? It is difficult to see how a more unsatisfactory record could be presented.

The claim that immunity had been conferred upon men because they failed to contract yellow fever through a prolonged residence in the country seems to me as far-fetched as an argument could be, short of the ridiculous. Many of us have known numerous non-immunes, or supposedly non-immunes, who lived

in Cuba even during the worst years of the scourge without, to their knowledge, having suffered an attack of yellow fever.

The rest of Dr. C. E. Finlay's paper deals entirely with hypotheses, conjectures and possibilities, in the discussion of which it would be useless to enter. To say that sufficient experiment have not been made in one or another direction is a matter of personal opinion and no controversy can be sustained upon such ground. To deny the value of an experimental result, it is necessary to show where the flaw exists or else the contrary by another experiment; in the case of Finlay's yellow fever inoculations such demonstration has been made by the United States Army Board and by all the other investigators who, following upon its steps, corroborated all its findings; simply to cry out that it is not enough, that it must be done again, is, to my mind, extremely infantile.

Finally, I must be allowed to quote the great Finlay's first conclusion, in the paper oft referred to here (Fiebre amarilla Experimental segun la Técnica Moderna, Selected Papers, pp. 491-517). He says:

> (1) "The only natural process by which we *positively know* that yellow fever is transmitted from the sick to the healthy individual is by the stings of the stegomyia that may have previously contaminated themselves through biting a patient *during the first three days* of his attack of yellow fever."

In accordance with this, therefore, if that is the only way we "positively know," every other way must be considered speculative, conjectural, hypothetical and hence, from a scientific standpoint, not acceptable.

In the light of modern medical science, Finlay and Delgado's experimental cases are less creditable today than ever and although, as evidence of the authors' unswerving faith and painstaking labor they shall always stand as an honorable testimony, we must acknowledge it was through their own deficiencies that they unfortunately failed to serve the object for which they were intended.

The fact of their uselessness cannot dim the glory that is Finlay's for the brilliant triumph of his theory.

PROCEEDINGS OF THE AMERICAN SOCIETY OF TROPICAL MEDICINE.

INVESTIGATIONS ON THE PREVALENCE AND CLINICAL FEATURES OF INTESTINAL BILHARZIOSIS (SCHISTOSOMIASIS MANSONI) IN PORTO RICO.*

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Preliminary Remarks.

It was in February, 1904, during the course of certain investigations undertaken for the purpose of throwing light on the obscure etiology of several cases of dysenteric, afebrile, and recurrent enteritis, rebellious to usual treatment, that I discovered lateral-spined eggs of *Bilharzia* in the excrement of two young Porto Ricans who never lived or traveled except in this island.

Two months later I addressed to the assembly of the Medical Association of Porto Rico, held on April 3, my first written communication[27], describing the clinical history of both cases, and claiming the right of priority to the important discovery which I had just made.

That memorial was published in a thirty-two page pamphlet entitled "Bilharziosis in Porto Rico"[27] and a copy thereof was forwarded to the Congressional Library as well as to a large number of professional reviews, and to several prominent investigators in the United States, England and France, who are especially interested in questions tending to a better knowledge of the geographical distribution and etiology of *schistosomiasis*.

The conclusions that I believed myself authorized to draw at that time were the following:**

1. As shown by the cases I have cited, in which, under no circumstances can it be supposed that the infec-

*Read at the thirteenth annual meeting of the American Society of Tropical Medicine, held in Washington, May 9, 10 and 11, 1916.

**I. González Martínez. Bilharziosis in Porto Rico, page 31. San Juan, Porto Rico. April 3, 1904.

tion was contracted in a foreign land, since the patients never left their native country, Bilharziosis is a disease naturalized in Porto Rico.

2. It probably made its appearance during the shameful period of slavery, being brought in **with the Africans imported** by infamous slave-traders from **Congo,** Angola and Kafir Land, **this circumstance explaining its possible predominance in the zones where cane is cultivated.**

3. There is no reason, therefore, to further consider the disease as endemic to the African continent, since my **observations categorically show its increasing spread to regions held as immune up to the present time.**

4. It is a disease common to coast regions and particularly to swampy lands where, in many cases, its infecting larvæ will live beside the cercariæ of *distoma heptacium,* the latter parasite being spread to an enormous degree among the bovine species of the Northern and Western parts of the island, as I have been able to prove.

5. It seems that in Porto Rico, in contrast with other countries where bilharziosis exists, the intestinal form is more frequent than the genito-urinary.

6. The frequency of the disease is far less than that of filariasis, and compared with uncinariasis, it falls to a minimum.

7. As in the Dark Continent the greatest number of infections is recorded in the male sex, because, as I believe, said sex is more easily exposed to infection.

Thanks to the courtesy of the members of the first Anemia Commission of Porto Rico, Drs. B. K. Ashford, W. W. King and Pedro Gutiérrez Igaravidez, I had the fortune, six months later, of performing an autopsy in the Municipal Hospital of Arecibo on the corpse of P. C., one of the patients of said Commission, who died of intense uncinariasis complicated with intestinal bilharziosis and pellagra. I extracted from the trunk of the portal vein and its tributaries 219 *schistosomes,* most of which were males, although a few bore the female in the gynecophoric canal. Said parasites were almost wholly distributed among Drs. Rafael Blanchard, Paris; Charles W. Stiles, Washington; and John Catto, London, to whom I also forwarded specimens of eggs having a lateral spine.

In December, 1904, I sent to the *Review of Tropical Medicine,* of Havana, a brief note reporting my observations in 1321 un-

selected cases examined by me, among which I found 59 infected with schistosoma and suffering from intestinal bilharziosis.[63]

The *Journal of Tropical Medicine and Hygiene,* of London, also reported the aforesaid investigations in its number of March 15, 1905.[64]

On July 2, 1905, I addressed the annual scientific assembly of the Medical Association of Porto Rico, placing before that assembly a study, under different aspects, of our peculiar form of Bilharziosis, and reporting my discovery of lateral-spined eggs of schistosoma in a patient coming from Santo Domingo. The conclusions derived from such study confirmed many of my previous assertions, which may be summarized as follows:*

1. Bilharziosis is a disease naturalized in Porto Rico, Martinique and Santo Domingo, and very probably in the other Antilles.
2. It has very possibly extended to the continent.
3. It was apparently introduced by negro slaves.
4. It is a disease peculiar to coast regions and swampy lands where cane is cultivated, in which places the larva lives in consort with that of the *fasciola hepatica* or *duva*.
5. In Porto Rico, Santo Domingo and Martinique the clinical form up to the present established, is intestinal.
6. Not one single case of the genito-urinary form has been recorded in said countries.
7. The disease has spread to such a high proportion as 7.8% because of lack of habits of cleanliness among our country people.
8. The largest number of cases is recorded in the male sex.
9. Bilharziosis determines changes in the globular composition of the blood, which changes are distinguished by **mild leukocytosis**, moderate eosinophilia (8%) and moderate mononucleosis (10%).
10. Bilharziosis, even in its intense form determines but slight anemia. Moreover, it does not conflict with regeneration of the blood in intense anemia, as shown by some cases of mine where the hemoglobin has increased from 9% to 100%.

A second autopsy performed in Mayaguez in the month of January, 1905, on the corpse of another patient suffering from

*Scientific assembly of the Medical Association of Porto Rico. Bulletin of the Medical Association of Porto Rico, July 2, 1905, pages 108-111.

uncinariasis and concomitant intestinal bilharziosis, furnished me two males which, preserved in formol, 5%, I forwarded to Professor Blanchard, taking advantage of the opportunity to inform that eminent zoologist of my suspicion of the probable existence of a new species of schistosoma responsible for the symptoms and anatomical changes characteristic of bilharzian enteritis. And my opinion was based not only on the geographical distribution of this clinical form of schistosomiasis, but chiefly on the peculiar and constant disposition of the spicule of the egg, and on the exclusive selection of the veins of the colon and rectum as a lodging for the female during ovular deposit.

The foregoing information is included in the present memorial not only because it constitutes the first steps in the evolution of our endemiologic knowledge of intestinal Bilharziosis in Porto Rico, but also *because it proves incontrovertibly that the first cases of this disease pointed out among natives of the Antilles, and perhaps in America too, were those described by me in my monograph of April* 3, 1904.

In fact, according to such information as I have been able to obtain, it seems that the medical literature of America, and principally that of the United States, records only five cases of Bilharziosis published prior to mine: 1st. The case of Booth, of Sparta, Ill., in 1882. 2nd. The case of B. F. Curtis, of New York, in 1896. 3rd. The case of Brooks and Sonders, in 1897. 4th. The case of Walkers, Evansville, Ind., in 1900. 5th. and last, the case of Pool, New York, in 1903. But in all these patients the genito-urinary form only was observed, the same being produced by *Schistosoma hematobium,* not taking into account that in the cases of Curtis, Brooks and Pool, *they stated that they had visited and remained in infested parts of Africa.*

It is true, however, that in 1902, Sir Patrick Manson[50] had already found lateral-spined eggs of *Schistosoma* in the feces of an Englishman who returned to London after having resided for several years in the Antilles. It is also true that this observation induced him to consider as probable the existence in America of a species of *Schistosoma* determining bilharzian enteritis, the same being different from *Schistosoma hematobium*

or the agent producing hematuria in Egypt. But it is not less true that while this discovery of the illustrious English author was made on a European temporarily residing in the New World, on the other hand, ours was made on two young natives of the Island of Porto Rico who had never been across the seas prior to said time.

In this manner I had *the fortune of being the first to offer solid support of the ideas of Manson* and brilliantly to confirm the same, as the very interesting investigations and discoveries of Piraja da Silva in Bahia and of P. C. Flu in Surimam established the exactness of Manson's hypothesis, and of my theoretical suppositions on the specific differentiation of intestinal Bilharziosis.

Definition, Varieties and Geographical Distribution.

The general name of *Bilharziosis* comprises all the functional and anatomical changes produced in the human organism by infection with *Bilharzia* or *Schistosoma.*

Schistosoma are bi-sexual sanguicolous parasites belonging to the class of platyhelminths, order of trematodes, family fasciola. There are three species parasitic in man, each capable of producing specific symptoms and lesions, which give rise to as many clinical forms of the disease.

Said species are: 1. *Schistosoma,* or *Bilharzia hematobium,* the direct agent of hematuria in Egypt, or genito-urinary bilharziosis. 2. *Schistosoma mansoni,* the determining cause of intestinal bilharziosis or bilharzian rectocolitis. 3. *Schistosoma cattoi* or *japonicum,* the agent of the disease known as Katayama or arteriovenous bilharziosis of China and Japan.

Each of these species also has its own peculiar geographical distribution. Thus *Schistosoma hematobium* is spread greatly throughout northern, eastern and central Africa and as far as the southern part of said continent. The Japanese variety of *Schistosoma cattoi* extends throughout China and Japan, and *Schistosoma mansoni* prevails in the Belgian Congo, having spread to the Antilles, South America and some regions of the United States.

It is precisely of this species and of the parasitic pseudodysenteric rectocolitis which it produces, that I shall treat of in this paper.

Some respectable authors—among them Le Dantec[45]—propose the substitution for the names of intestinal bilharziosis and intestinal schistosomiasis, that of American schistosomiasis, and for the name *Schistosoma mansoni, Schistosoma americanum,* But we are of the opinion that such nomenclature is incorrect, for no one has as yet proved that *Schistosoma mansoni* is not of African origin. On the contrary, it is more than probable, almost a certainty, that the intestinal schistosomiasis prevalent in America was brought to us by the pirates who carried on the slave trade, through the West African negroes that they profusely distributed among the Antilles and on the continent.

Value is given to this well-based supposition by the investigations of Firket, the first to describe bilharzian pseudodysentery, and by the investigations of Broden, both of which were made in the Belgian Congo, where they assert having found numerous subjects suffering from intestinal schistosomiasis, expelling only lateral-spined eggs.

And many of the negroes imported into the Antilles and the continent came precisely from the Congo and regions adjacent thereto.

ETIOLOGY.—With the exception of Looss and his followers, few now doubt that the living agents of intestinal bilharziosis, i. e., *Schistosoma mansoni,* should constitute a distinct species within the genus *schistosomum.*

The ingenious as well as fantastic theory of that great zoologist to explain the formation of the lateral-spined eggs in the ootype of unfecundated females, besides absolutely lacking an experimental base, will not stand the slightest criticism on theoretical grounds.

If the lateral-spined eggs are an unfecundated, accidental and transitory product in the life of the female, how does Looss explain the continuous appearance during successive years of this variety only, in the feces of subjects suffering from bilharzian rectocolitis? And how does he explain the almost constant appearance in such eggs (which he considers unfecundated) of a ciliated, mobile embryo which breaks and escapes from the shell as soon as it is placed in contact with water? If such were the truth, how could I have obtained the figures that accompany this communication in order to show the embryo sometimes

at rest, in contraction within the shell at other times, and again free?

If *Schistosoma hematobium* and *Schistosoma mansoni* constitute one single species, how does Looss explain the complete absence of hematuria and of terminal-spined eggs in the Antilles, where bilharzian rectocolitis prevails exclusively?

If in Africa and America the normal habitat of adult bilharzia is in the region of the portal vein, how does Looss explain the exclusive preference of American female schistosoma for the hemorrhoidal veins in making their ovular deposits, and the preference of the vesical plexuses in Egyptian bilharziosis?

I have had the opportunity of performing two autopsies on subjects who died of intense uncinariasis, but who at the same time were infected with *Schistosoma mansoni,* and in neither case did I find lesions in the region of the genito-urinary organs, nor did an examination of the urinary sediment reveal anything in particular.

Besides, I have examined many thousands of eggs and have conscientiously studied numerous samples of urine, but I have not had the good fortune of discovering one single specimen of eggs having a lateral spine.

And greater weight will be added to this negative data, by the fact that all of us who compose the Permanent Anemia Commission of Porto Rico, and who are the present members of the Institute of Tropical Medicine and Hygiene carefully sought among the patients at the hookworm dispensaries, any cases of bilharzian hematuria, but without success, and it must be remembered that in the course of eight years, over 300,000 persons were treated at these places.

Now then, it is necessary to confess that these reasons are not sufficient to prove irrefutably the distinction between the two species, but the anatomo-pathologic investigations of Maurice Letulle,[44] and the anatomical study of the parasites by Piraja da Silva, and by P. C. Flu have brought out such marked differences that Looss' theory has been forever destroyed. Thus Letulle describes as an anatomical lesion characteristic of intestinal bilharziosis, an obliterating endophlebitis accompanied by integrity of the endothelium and hyper-genesis of the subjacent layer, and Piraja da Silva discovers that the female

Schistosoma mansoni has a pointed caudal extremity different from the cilindro-conical extremity of the *Schistosoma hematobium,* and Flu points out the constant lack of symmetry of the ootype; more pronounced sinuosities in the disposition of the ovary; and an anatomical peculiarity which he considers characteristic of the male of the species in question, such peculiarity being the perpendicular incidence of the anterior edge of the lateral folds on the anterior portion of the body.

Accepting, therefore, that the specific differentiation between the two schistosoma has been established, we shall immediately describe at large the species *Schistosoma mansoni*—an appellation proposed by Sambon in 1907 to designate the species producing bilharzian rectocolitis.

Piraja da Silva describes the adult worm as follows:

"The male measures 12 millimeters in length by 448 microns in width at the middle, 224 at the cephalic extremity and 56 at the caudal end. The ventral sucker measures 140x420 microns, the pedicle having a length of 84 microns. The mouth has a diameter of 280 microns. The distance between the mouth and sucker is 504 microns. The parasite has a tapering tail, and the outer surface of the body is covered by spines that do not seem as prominent as those of **Schistosoma hematobium.** The genital organs are composed of seven testicular masses and seminal vesicles.

"The female measures from 14.5 to 15 millimeters in length by 168 microns in width at the middle, 56 at the cephalic extremity and 84 at the caudal end. The worm terminates in a pointed tail which tapers to such an extent that the posterior end of the digestive tube is 336 microns from the point of the tail, while in **Schistosoma hematobium,** the caudal part of which terminates more abruptly, this distance is reduced to 130 or 180 microns as a maximum. The ventral sucker measures 84x56 microns, and the mouth has a diameter of 84 microns. The distance between the mouth and sucker is from 224 to 252 microns.

"The genital organs of the female comprise the gemogen or ovary, and the vitellogen, each of which has its excretory canal. These two canals join in the shell gland from which an evacuating canal runs, the latter alone dilating to form the uterus. The vulva opens behind the ventral sucker, and the uterus always contains a lateral-spined egg, even while the female is in the gynecophoric canal of the male, and consequently fecundated."*

The *miracidium* or ciliated embryo takes different forms according to whether it is observed in water, rid of its ovular covering and free, or inclosed within the walls of an unbroken shell. In the first case it is generally cylindrical when conditions of life are favorable, although it varies unceasingly by stretching and shrinking in proportion to the contractile activity of the muscular layers. When death approaches, the movements cease, the body flattens, and sarcodic balls appear.

Seen within the shell through the transparent walls thereof, the embryo has an oval form, one extremity being narrower than the other and imitating a trunk. This extremity is the

*Le Dantec. Precis de Pathologie Exotique, Tome II, page 866. Paris, 1911.

cephalic portion, while the other, which is much larger and round, is the posterior or caudal region.

Although the method of fixation by tetroxid of osmium proposed by Lortet and Vialleton,[47] in experienced hands may give

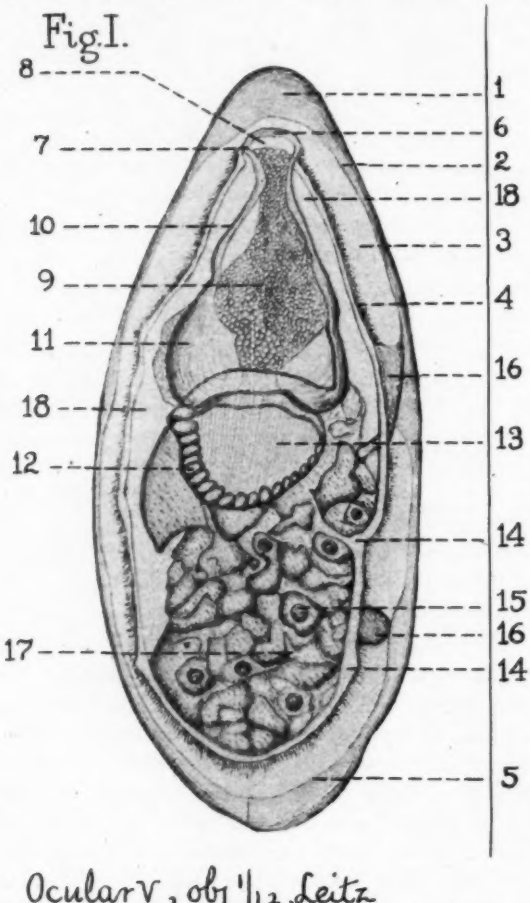


Figure I.

excellent definitive preparations, I believe, however, that it would be easier for beginners to appreciate the different details of the anatomy of the miracidium by studying it preserved alive

and immovable within the walls of its ovular covering which is fortunately very transparent.

It was in this manner that I obtained the preparations that allowed me to copy by means of Abbe's drawing camera the figures illustrating this paper.

In fact, there is nothing easier than providing one's self with abundant material by seeking mucous dejections free from large solid particles that might obstruct observation.

Besides, certain metallic medicines, certain cathartics and some excitant condiments have the power of provoking acute dysenteric outbreaks of bilharzian rectocolitis accompanied by abundant discharge of mucus heavily laden with eggs.

The outer surface of the miracidium, as shown by figures 1 and 2, is covered by vibratile cilia, which are swimming organs necessary for rapidity in movement. These cilia extend over the whole body except the rostrum or proboscis. The base of said proboscis or oval papilla, constitutes the neck, and is the place by which the embryo fastens to the ovular covering, in which disposition it remains until full development is acquired.

REMARKS.

1—Chitinous covering. 2 and 5—Double contoured.
3—Leuckart's external ectodermic membrane.
4—Ciliary covering of the embryo. 6—Proboscis.
7—Excretory orifice of the gland.
8—Entrance orifice of the stomach. 9—Stomach sac.
10—Excretory tube of the gland. 11—Unicellular gland.
12—Cellular coat of the nervous system.
13—Central granular part of the nervous system.
14—Orifice of the excretory apparatus and vibratory ciliary fringe.
15—Germinal cell with its nucleus.
16—Zapfchen (Pivot).
17—Location of the spine on the opposite side.
18—Cœlomic cavity.

Under the ciliated skin there lies a double muscular layer, longitudinal and transverse, as in the embryo of the *Fasciola hepatica*.

The digestive apparatus is represented by a rudimentary stomachal tube filled with a granular substance, the opening being towards the oral extremity, where there also open, though independently, the ducts of two unicellular glands placed one at each side of the stomachal tube.

The nervous system, formed by a bunch of granular cells, immediately follows the most posterior portion of the digestive apparatus.

The excretory system is composed of two coiled tubes opening to the exterior through four ventral funnel-like openings provided with crowns of long delicate cilia having an undulating movement. These vibratile crowns are very important in distinguishing such eggs as reach complete maturity. The undulating movement of these crowns—similar to that of an oriflamme—may be seen perfectly through the ovular covering, by means of an optical combination augmenting 400 diameters. The presence of such movement not only proves the vitality of the miracidium, but also its readiness, in appropriate surroundings such as water, to break the shell, gain its liberty and proceed to find its *intermediate abode.*

Fig. II.

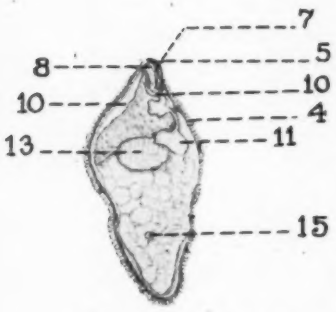


Figure II: Free miracidium; oc. IV; obj. V, Leitz.

Fig. III.

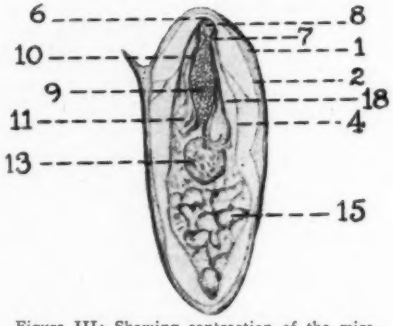


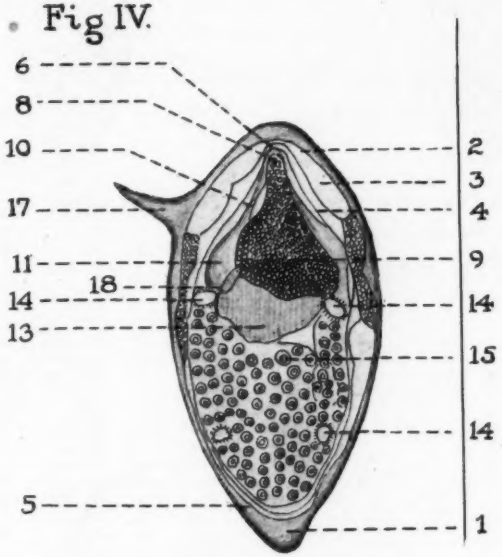
Figure III: Showing contraction of the miracidium when the egg is submerged in water; oc. V; obj. V, Leitz.

When attentive observation fails to disclose the four undulating crowns, it is then almost certain that the embryo is dead, or that the egg is immature.

The eggs of *Schistosoma mansoni* are yellowish, slightly transparent, and two and one-half times longer than those of the *Necator americanus,* and twice as wide. They have the form of a flattened ovoid, one extremity being thicker than the other, and are always provided with a lateral spicule situated 30 or 40 microns from the larger pole. They generally contain a fully developed embryo, but immature ones are at times observed.

There is nothing easier than the investigation thereof, an increase of 150 to 300 diameters being sufficient. Even for structural details a combination of ocular 3 with Leitz' objectives 3 and 5 will suffice.

Fig IV.

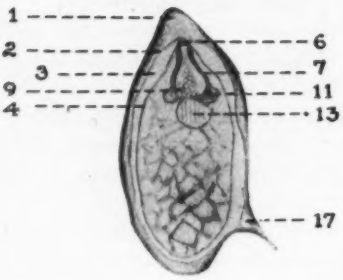


Dorsal view; Schematic; oc.IV, obj.VII, Leitz.

Fig V.

Dorsal view; ocular IV; obj. III, Leitz.

Fig. VI.



Schistosoma Mansoni's eggs
Dorsal view; oc. 3, obj. 5, Leitz.

Fig. VII.

Ventral view; oc. 2, obj. 5.

Fig. VIII

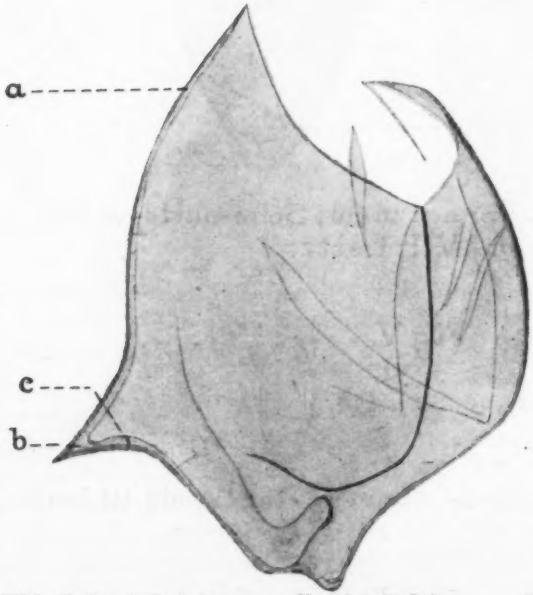


Figure VIII. Broken shell of the egg; oc. V; obj. 1/12, Leitz.

I have found that the dimensions of the eggs fluctuate, in regard to the longitudinal diameter, between 112.24 and 173.24

Table I

Dimensions of the egg and the spicule.

	BODY		SPINE	
No.	Length in microns	Width in microns	Length in microns	Width in microns
1	151.28	58.56		
2	151.28	56.12	24.4	7.32
3	136.64	56.12		
4	136.64	58.56	24.4	9.76
5	169.50	101.70		
6	146.90	73.45		
7	124.30	62.15		
8	141.25	56.50	22.6	7.06
9	141.25	56.50		
10	158.20	56.50		
11	135.60	62.15	22.6	7.06
12	129.95	62.15		
13	129.95	56.50	22.6	7.06
14	158.20	62.15	16.95	7.06
15	141.25	56.50	22.6	7.06
16	141.25	67.80	22.6	5.65
17	173.24	78.		
18	141.52	68.32		
19	136.64	58.56	26.8	
20	112.24	55.56		
21	161.04	89.96		
22	170.80	78.96		
23	156.16	82.96		
24	165.92	82.96		
25	156.16	73.		
26	131.76	73.20		
27	170.80	73.20		
28	126.88	58.56		
29	146.40	73.20		
30	167.	82.96		
Average Dimensions	147.	67.09	22.7	7.5

Extreme dimensions

Of the egg: Greatest length--- 173.24 microns; Minor length------112.24 microns; Greatest width-----101.70 microns; Minor width------- 55.56 microns

Of the spicule: Greatest length- 26.8 microns; Minor length---- 16.95 microns

microns, and as to the transverse diameter at its widest part, between 55.56 and 101.70 microns. The spicule measures from

16.95 to 26.8 microns in length by 5.65 to 9.76 in width at the base. These measurements are somewhat greater than those obtained by Letulle, and approximately equal, with the exception of the dimensions obtained from an uncommonly large egg, to those of Piraja da Silva. It must be borne in mind, however, that Maurice Letulle took his measurements from preserved eggs, which were consequently somewhat shrunken.

The following table contains the dimensions of 30 eggs, and gives a clear idea of the multiplicity of individual variations:

As to the thickness of the ovular covering the measurements taken from the specimen shown in the figure, give 1.2 microns in some parts and 3 microns in others. The spicule, as may be seen, is hollow for two-thirds distance from the base, and solid towards the sharp point, for a distance of 8 microns.

Life History and Mode of Introduction.—Mature eggs expelled with excrement from the intestinal canal cannot arrive at spontaneous dehisence while imprisoned in feces undiluted or not submerged in natural organic liquids. The mixture thereof with an abundant proportion of water is necessary, when the miracidium commences to move and contract vigorously until it ruptures the fastenings that hold it to the ovular covering, which, once broken, is followed by the splitting of the shell. Through the split it glides out to commence a vertiginous search for the mollusk which will serve as its intermediate abode. The miracidium penetrates directly into the body of such mollusk, takes refuge in its interior organs, turns into redia, the rediæ produce cercariæ, and the latter, abandoning the transitory abode, wait free in the water of marshes, in the smooth waters of rivers and among aquatic plants, for the opportune moment of attacking their victim and definitive lodging—man. They introduce themselves sometimes through the skin, and other times by the digestive canal, entering the stomach in unfiltered water. They immediately proceed to the organs of their predilection (in this case the liver and vessels of the portal circulation) evolve to adult form, and after sexual intercourse in the thick branches of the mesenteric inferior vein, the female leaves the male and alone descends to the capillaries of the sub-mucous layer of the rectum and the inferior part of the colon, where it lodges during

the ovular deposit which is to insure the perpetuation of the species.

The descent and progression in a direction contrary to the circulation is favored by the absence of valves in those veins, and perhaps also because the male assists by carrying the female to the vessels ranging from 1½ to 2 millimeters in caliber.

To prevent the embolical expulsion of the eggs just laid in the circulatory current, by the force and direction of the current, the female must select vessels of small caliber which without endangering her life or impeding her return to the thicker trunks where the male resides, will permit her, however, to obstruct its passage with the caudal extremity of the body and to retard temporarily the course of the blood above the obstacle, for such time as the deposit of eggs may last. Internal pressure will increase unceasingly because of continuous though slow afflux of blood, and because of the accumulation of eggs in an inverse direction, as the parasite expels them. Such increase of pressure throws the eggs against the walls of the capillary, pushes one egg against the other, and thus provokes and facilitates perforation of the endothelium by the steeled spicules with which they are armed.

Once out of the endothelial layer of the vein, the eggs proceed towards the intestinal mucosa receiving impulse from the muscular fibers. There they accumulate until favorable circumstances drive them into the intestinal canal, and from the latter, with the fecal matter, to the exterior, where the miracidium is liberated and the life history again commences.

We have said that the embryos of schistosoma go through the redia and cercaria stages before infecting man, and that the free cercaria is re-introduced, entering by the mouth in unfiltered water. This opinion, maintained by many investigators since the first years of the discovery of bilharziosis in Egypt, has been strongly refuted by Looss, of Cairo.

The illustrious German zoologist created the theory of *direct penetration of the skin by the miracidium*, and its transformation into sporocyst in the liver, and into cercaria and adult vermes afterwards, without necessity of resorting to an intermediate abode. But this theory, supported by a base purely hypothetical, has not received experimental confirmation.

In fact, E. F. Bour[6] who worked under exceptional conditions, choosing and applying such methods as would reasonably insure success, failed absolutely and could not obtain direct infection by the miracidium. And as Bour failed, so failed Conor[17] and all who followed Looss' ideas.

This does not occur with the opinion first expressed which is based on the general law governing the biology of other trematodes, and of which I have been a warm partisan for reasons not only of probable analogy of evolution, but also because of my own personal observations on the distribution in Porto Rico of intestinal schistosomiasis of man, and of distomatosis hepatica in bovines at the same endemic center.

Furthermore, the autopsy performed on P. C. in 1904, of which previous mention has been made, allowed me to discover specimens of *Fasciola hepatica* (liver fluke), which were considered by Charles W. Stiles as belonging to a *new species.*

The investigations of the last few years have almost wholly dissipated the shadows surrounding the life history of schistosoma—parasite of man—thus solving one of the most debated questions of tropical etiology. R. Miyairi and M. Suzuki[52] state that in 1913 they observed the penetration of the miracidium of *Schistosoma japonicum* into the body of a snail having a dark shell with seven spirals; that after twelve days the radiæ were already formed; and that submerging rats for 3 hours during four consecutive days in the water contained in the vessel where the snails were cultivated, such rats became infected and contained schistosoma in the liver 3 weeks later. Watkins-Pitchford[62] states that in Natal, Cawston succeeded in infecting African *Linnea Physopis* with miracidium of *Schistosoma hematobium,* and that three weeks later he found cercariæ in the liver.

But it is above all, to Leiper that science owes the clearing of the life history of schistosoma. Working with Atkinson in Katayama and Shanghai he discovered that the miracidium of *Schistosoma japonicum* penetrated the body of a mollusk called *Katayama nosophora* (Robson) and evolved within its organs until it became cercaria. These cercariæ, free and numerous in the water where the *nosophora* were cultivated, penetrated the skin of rats submerged in said water, access to the mouth being

prevented, and the autopsy performed on such rats (later transported to London) disclosed live schistosoma in the mesenteric vessels, thus at once proving not only that the life history thereof is similar to that of *Fasciola hepatica,* but also that the infecting cercariæ may introduce themselves through the skin. His recent investigations in Egypt during the first half of the year 1915 more clearly prove that a similar life history occurs in *Schistosoma hematobium,* for operating on mollusks *Bullinis* and *Planorbis* he has obtained numerous cercariæ and has infected rats, white rats, guinea pigs and Mangabey monkeys, all of which at autopsy showed an enormous proportion of adult schistosoma in the portal venous system. Leiper has proved, moreover, that the cercariæ do not die by immersion for five minutes in a solution of hydrochloric acid at 1x800, and that therefore, the infection of man is possible by the entrance of cercariæ into the stomach, and in fact, the monkey subjected to the test of ingestion had in its mesenteric veins, a larger number of schistosoma than those inoculated through the skin. Finally Leiper proved that penetration is rapid, for one of the rats became infected by remaining only ten minutes in water containing cercariæ.

In Porto Rico there is no doubt that the cercaria introduces itself facultatively according to circumstances, sometimes by way of the stomach, and other times by penetrating the skin. Many of the cases observed by me while working in Mayaguez, occurred in women born and bred in excellent financial conditions, belonging to society's privileged classes, who were never obliged to engage in agricultural labors, who never bathed in rivers or stagnant waters, and who never went barefooted. But they did confess to having frequently eaten raw fruits and fresh vegetables spontaneously growing or cultivated in suspicious places. They also remembered having drunk unfiltered water from wells roughly constructed in infested regions. On the other hand, the most careful and minute investigation did not discover the occurrence in said cases, of circumstances favorable to an introduction through the cutaneous channel. It must be admitted, therefore, that such cases were infected by cercaria which entered the stomach with impure water or poorly washed vegetables.

Men, however, generally contract infection by way of the skin. With a few exceptions, they are in the habit of bathing in rivers, and the major part of the inhabitants of the country districts are laborers who always go barefooted.

In Utuado, where like men, women cultivate the soil or engage in the work of washing clothes on the margins of two heavily infested rivers, and where children of either sex and of all social classes bathe and remain for hours at a time in these rivers, infection is surely contracted through the skin.

Pathology.—The permanence of *Schistosoma mansoni* in the mesenteric veins provokes a series of anatomo-pathological changes in the large intestine and in the cellular tissues of the pelvic basin, which should be considered, to a certain degree, as specific of this parasitic disease.

It was believed and maintained for a long time by a number of authors that the adult vermis, male or female, was itself inoffensive, and that the anatomic changes observed, and the corresponding functional disorders should be attributed to the steeled spicule of the eggs. But the investigations of Maurice Letulle proved that the numerous and extensive traumatisms produced by the suckers and dorsal papillæ of the male, and by the suckers and tail of the female determine inflammatory reaction in the veins, which is distinguished by *simple vegetative endophlebitis accompanied by absolute integrity of the endothelium and hypergenesis of the circumjacent elastic tissues.*

Such special endophlebitis, considered by Letulle as the fundamental specific lesion of intestinal bilharziosis, appears not only in the capillaries of the sub-mucous layer where the female deposits her eggs, but also in the thick vessels of the mesorectum and mesocolon, and throughout those that serve as lodging for the parasite.

The different tunics of the intestine equally suffer the irritating stimulus of numerous traumatisms produced by the spicule of the egg, and also the phlogogenic action of some toxin discharged by the worm. The tunics respond to such perturbing agents by ulcerative and hyperplastic processes. The ulcerative processes are the result of diffuse chronic inflammation of the intestinal mucosa accompanied by destruction of the glandular tubes and disappearance of the epithelial layer. Such

destruction is not deep. It becomes covered by fleshy granulations when secondary bacterial infection occurs, and unlike the real dysenteric ulcers, it stops before reaching the muscularis mucosæ. The hyperplastic processes become generalized in the fundamental tissues of the mucosa and are accompanied by hyperplasia of the glandular elements, forming real glandular adenomata and greatly vascularized polypiform eminences of a dark reddish color.

In the sub-mucous layer, which is the place chosen by the female for her ovular deposit, besides the endophlebitic lesions above mentioned, there is also observed a considerable development of fibrous tissue, and a notable thickening and hardening of the intestinal walls.

Such sclerosis immediately following a chronic diffuse inflammation, spreads to the pelvic cellular tissues, and there is no doubt that in its genesis there is the phlogogenic action of irritating toxins secreted by the parasite.

So far as relates to the changes caused in the globular composition of the blood, and in its wealth of hemoglobin, by infection with this parasite, I must state that it is a question very difficult to solve, because unfortunately, in tropical regions where bilharziosis occurs, uncinariasis, a disease which greatly disarranges the hematologic formula, is endemic and widely spread.

I have endeavored to group in distinct series such patients as were victims of both infections, and have constituted a special group of cases of intestinal bilharziosis free from uncinariasis, but I must note, however, that although I have been able to eliminate the presence of uncinaria, I have been unable absolutely to discard that of other parasites such as tricocephalus and ascarides, so common in this country. But their power to modify sanguineous cytology is so small that I do not believe they produce perceptible changes.

Table I comprises a series of 18 subjects infested by *Schistosoma mansoni,* but free from uncinaria. Although there are included among them, some at the same time suffering chronic perturbing diseases such as syphilis, splenomegalia, chronic rheumatism, malaria and chronic streptococcemia, it may be observed that with the exception of case No. 2, who died a few days later, the rest all show a relatively high hemoglobinal

index, ascending to over 65%. And if those suffering from such intercurrent diseases or from accessory parasitism are eliminated in order to consider only those cases of pure bilharziosis, then the good condition of the blood of said subjects may be plainly seen by hemoglobinometric readings of 95, 98, 105, 74, 98 and 92%, which prove my assertion that it is a disease which *does not determine notable anemia.*

Table II

Case No.	Date.	Age.	Sex.	Color.	Per cent Hemoglobin.	Red cell per cubic millimeter.	Color Index.	Leucocytes per cmm.	Percentage of Leucocytes.							Remarks.
									Polynuclears.	Eosinophyl.	Basophyl.	Lymphocytes.	Large mononuclears.	Transitionals.	Myelocytes.	
1	2807-04	28	F	W	99	5,040,000	0.98	8,800	60.	10.8	22.	5.	22.			Bilharzia Splenomegalia Took arsenic and strychnia
"	29-7-04	"	"	"	99	5,293,916	0.95	14,532	80	10.	23.2	6.4	0.4			
"	16-8-04	"	"	"	99	5,172,000	0.98	7,600	58.4	9.6	24.4	8.	19.2	0.4	0.4	
2	27-8-04	60	M	W	14	933,830	0.74	11,600	65.6	2.	24.	7.6	0.8			84.4 nerve and 84.1 megalocytosis per cmm. Pernicious anemia. Birth.
3	1-10-04	22	F	W	80				43.2	8.8	30.8	15.6	1.2	0.4		
"	28-2-05	"	"	"	83	4,668,000	0.88	6,000	20.2	4.	26.8	23.8	0.4	0.4		
4	28-10-04	50	M	W	93				60.4	10.	25.6	3.6	0.4			Bilharzia. Trichocefalus. Is a syphilitic.
"	26-2-05	"	"	"	84	4,792,000	0.79	9,000	71.2	6.8	12.8	8.4	0.8			
5	2-11-04	45	F	W	96				76.	4.	8.4	9.2	0.4			Bilharzia. Endometritis.
"	18-2-05	"	"	"	90	5,924,286	0.76	8,800	68.8	9.2	9.6	10.8	1.2		0.4	
6	10-11-04	25	F	W	89				48.	13.2	28.8	11.6	0.4			Bilharzia and chronic rheumatism.
"	17-2-05	"	"	"	76	4,112,000	0.94	6,400	67.2	14.8	24.	12.4	0.4	0.4	0.8	
7	22-11-04	24	F	W	87	4,171,380	1.04	11,800	60.4	3.4	28.	10.8	0.4			
"	7-2-05	"	"	"	83	4,050,000	1.02	10,166	65.2	2.4	22.	9.6	0.8			
8	24-11-04	23	F	W	87	4,208,318	0.79	8,000	64.8	9.2	28.4	7.8				Bilharzia. Trichocefalus.
"	9-1-05	"	"	"	80				49.2	8.4	34.4	7.8	0.4			
10	15-2-05	32	M	W	95	5,382,992	0.74	9,732	61.2	10.4	27.2	10.	1.2			Bilharzia only.
11	22-2-05	11	M	W	92	5,548,000	0.97	12,200	52.4	24.4	26.	14.4	1.2			Bilh., Anquil., Trichocefalus.
12	20-2-05	44	F	M	98	4,668,000	1.06	6,400	48.4	8.8	32.4	11.6	0.4			Bilharzia only.
13	27-2-05	23	M	W	100	6,894,000	0.79	9,000	71.2	6.8	12.8	8.4	0.8			Bilharzia only.
14	29-10-04	27	F	W	74				43.2	11.6	34.8	8.	0.4			Bilharzia
15	1-11-04	40	F	W	66				60.4	8.8	24.	9.2	0.4			Bilharzia, Trichocefalus.
16	1-11-04	36	M	W	93				60.2	3.6	16.	20.	1.2			Bilharzia.
17	3-11-04	25	F	M	95				48.	4.8	34.4	12.4	0.4			Bilharzia.
18	14-11-04	19	M	W	86				42.8	7.2	38.8	6.4	4.4			Bilharzia, recurrent streptococcal infection
19	26-2-05	32	M	M	98				62.8	6.	25.	6.4				Bilharzian malaria.

Table II. Showing high percentage of hemoglobin in bilharzia cases not complicated with uncinariasis. Also the differencial leucocyte count.

Making a summary of the data shown in said Table II, to obtain averages lending themselves to the interpretation of groups, we find for intestinal bilharziosis the following hematologic formula:

Hemoglobin 88%

Erythrocytes 5,145,960

Table III.

Showing cases of bilharzia complicated with uncinaria, with high hemoglobin percentage.

Case No.	Date.	Age.	Sex.	Color.	Per cent hemoglobin.	Red cells	per cmm.	Color Index.	Leucocytes	per cmm.	Percentage of Leucocytes: Poly-nuclears	Eosino-philes.	Lympho-cytes.	Mono-nuclears	Baso-philes.	Turck's cells.	Remarks.
20	17-7-04	26	M	W	94						36.	12.	32.	19.2	0.8		Bilharzia, Uncinaria, Oxyuris Vermic.
"	2-8-04										58.	8.	27.2	6.4	0.4		
21	26-10-04	22	F	W	59						58.4	16.4	17.6	6.4	1.2		Bilharzia, Uncinaria, Trichocefalus.
22	1-11-04	27	M	W	84						68.	8.8	13.2	9.6	0.4		Bilharzia, Uncinaria.
23	15-11-94	26	F	W	85						66.	13.6	12.4	5.2	2.8		Bilharzia, Uncinaria.
"	26-12-04				89						59.2	17.6	17.2	6.			
24	12-11-04	6	F	N	53						34.	27.6	30.8	7.2	0.4		Bilharzia, Strongyl.int. Ascaris, lumbr.
25	4-1-05		F	W	91	5,960,256	0.76	1	14,000		40.4	28.4	20.	10.4	0.8		Bilharzia, Uncinaria.
26	26-1-05	16	F	W	86	4,411,794	0.97	1	10,200		46.4	24.4	19.6	8.	1.2	0.4	Bilharzia, Uncin., Tricho., Ascaris.
27	27-1-05		M	W	100						58.4	7.6	22.8	9.6	1.2	0.4	Bilharzia, Uncin., Tricho., Strongyl.

Leukocytes 9,363
Color index 0.81

Table IV.

Showing that the changes in the blood are dependent upon uncinaria.

Case No.	Date.	Age.	Sex.	Color.	Per cent hemoglobin.	Red cells per cmm.	Color index.	Leucocytes per cmm.	Percentage of Leucocytes.							Remarks.
									Polynuclears.	Eosinophiles.	Lymphocytes.	Mononuclears	Basophiles.	Turck's cells.	Myelocytes.	
58	13-9-04	12	F	W	17	2,444,000	0.34	14,000	38.	26.2	26.4	8.4	1.2	0.8	168	Bilharzia.
	20-9-04	"	"	"	19	2,432,000	0.38	13,933	39.2	28.0	27.2	4.8	0.8	2.		
	29-9-04	"	"	"	29	2,888,000	0.50	18,000	42.8	24.0	24.4	7.2	1.2			
	6-10-04	"	"	"	25	4,235,040	0.30	12,800	37.2	21.6	31.6	5.2	2.8	1.6	64.8	Uncinaria.
	18-10-04	"	"	"	27	2,913,540	0.46	10,200	40.8	20.8	32.0	4.0	1.2	1.2	81.6	Strongyloides.
	29-10-04	"	"	"	43	3,900,000	0.55	8,400	32.	21.2	31.2	10.	1.2	4.4	134.4	
	29-11-04	"	"	"	47	4,355,970	0.52	11,200	38.4	20.4	11.2	11.2	1.6			
	15-12-04	"	"	"	46			40.	28.8	15.6	10.8	1.6	0.4			
	28-12-04	"	"	"	67	4,756,000	0.70	16,400	34.4	38.8	18.8	8.				
	4-1-05	"	"	"	91	5,960,256	0.73	14,000	40.4	28.4	20.0	10.4	0.8			
80	20-8-04	16	M	W	9	1,334,345	0.33	10,752								Bilharzia, uncinaria, strongyl., trichoc., amebae. Since the examination in July no uncinaria eggs were found, nor amebae. No strongyl. embryos in feces.
	12-7-04	"	"	"	44			70.	8.2	16.0	8.0	0.8				
	10-8-04	"	"	"	40	5,400,000	0.45	12,800	56.	13.6	20.8	9.6				
	8-9-04	"	"	"	80			71.2	8.2	20.8	2.	0.4				
	18-9-04	"	"	"	70			66.	12.	14.8	6.8	0.4	1.2			
	14-10-04	"	"	"	95			53.6	4.8	22.8	18.0	0.4	0.4			Notwithstanding I found uncinaria eggs in the last examination of the feces.
	25-10-04	"	"	"	84			84.8	10.4	22.	10.	0.4				
	27-1-05	"	"	"	100			88.4	7.6	22.8	9.6	1.2	0.4			

Differential or Cytochromic Count.

Polynuclears	56.1%
Lymphocytes	23.7
Large Mononuclears	10.5
Eosinophiles	8.6
Labrocytes or Basophiles	0.7
Turck's stimulation cells	0.1
Myelocytes	0.3

Table V.

Showing hemoglobin percentage and leucocytosis in cases of bilharzia complicated with uncinariasis.

Case No.	Date	Age	Sex	Per cent hemoglobin	Leucocytes per c.mm.	Parasitism.
28	8-2-06	19	M	W: 61	12,600	Bilharzia, Uncinariasis, Trichocefalus Oxyuris.
29	8-2-06	13	M	W: 61	29,000	Bilharzia, Uncinaria, Trichocefalus.
30	8-2-06	22	F	W: 79	9,932	Bilharzia, Uncinaria, Trichocefalus.
31	9-2-06	19	M	W:103	8,800	Bilharzia, Uncinaria, Trichocefalus.
32	9-2-06	16	M	W: 77	13,600	Bilharzia, Uncinaria.
33	10-2-06	25	F	M: 32	6,266	Bilharzia, Uncinaria, Trichocefalus.
34	10-2-06	11	M	W: 98	12,066	Bilharzia, Uncinaria, Ascaris Trichocefalus.
35	10-2-06	19	F	W: 91	11,400	Bilharzia, Uncinaria, Trichocefalus.
36	11-2-06	39	F	W: 60	7,100	Bilharzia, Uncinaria.
37	13-2-06	21	M	W: 52	11,132	Bilharzia, Uncinaria.
38	13-2-06	30	M	M: 68	11,133	Bilharzia, Uncinariasis, Trichocefalus, Strongyloides.
39	13-2-06	20	M	W: 74	11,466	Bilharzia, Uncinaria, Tricho. Strongyl.
40	13-2-06	15	F	W: 82	12,932	Bilharzia, Uncinaria, Trichocefalus.
41	13-2-06	19	M	W: 85	8,866	Bilharzia, Uncinaria, Tricho., Splenomeg.
42	14-2-06	35	M	W: 90	14,066	Bilharzia, Uncinaria.
43	14-2-06	36	M	M: 58	9,200	Bilharzia, Uncinaria, Trichocefalus.
44	15-2-06	11	M	W: 86	10,532	Bilharzia, Uncin., Strongyl., Ascaris Strongyl.
45	15-2-06	40	F	W: 92	10,800	Bilharzia, Uncin., Tricho., Tyroglyfus.
46	15-2-06	29	M	W: 66	3,332	Bilharzia, Uncin., Strongyl., Tricho.
47	17-2-06	16	M	W:100	11,466	Bilharzia, Uncin., Strongyl., Tricho.
48	17-2-06	26	M	W: 50	9,200	Bilharzia, Uncin., Tricho.
~~49~~	~~17-2-06~~	~~32~~	~~M~~	~~M: 66~~	~~7,100~~	~~Bilharzia, Malaria.~~
49	20-2-06	14	F	M: 60	9,732	Bilharzia, Uncin., Tricho.
50	20-2-06	27	M	W: 88	8,000	Bilharzia, Uncinaria.
51	20-2-06	50	M	W: 81	10,932	Bilharzia, Uncinaria.
52	23-2-06	11	F	W: 90	11,866	Bilharzia, Uncin., Trich.
~~53~~	~~23-2-06~~	~~10~~	~~M~~	~~W: 90~~	~~10,666~~	~~Bilharzia, Tricho.~~
53	23-2-06	17	M	W: 57	9,600	Bilh., Unc., Tricho., Ascaris, Strongyl.

Color (W--- White. N--- Negro. M--- Mulatto.

Compared with the normal formula, the foregoing differs because of mild leukocytosis, median eosinophilia, moderate mononucleosis and decrease of the neutrophilic index.

The eosinophilia varies between the extreme limits of 2% and 24.4%, and mononucleosis—which is a constant feature—between 3.6 and 28.6%.

Table VI.

Showing the changes in the blood of bilharzia cases complicated with febrile diseases.

Case No.	Date.	Age.	Sex.	Color.	Per cent hemoglobin.	Leucocytes per CMM.	Percentage of Leucocytes								Remarks
							Poly-nucleears.	Eosino-philes.	Lympho-cytes.	Mono-nucleears.	Baso-philes.	Myelo-cytes.			
18	14-11-04	19	M	W	66		42.8	7.2	38.8	6.4	4.4				Bilh., Trich
4	17-2-05	"	"	"	90	18,466	76.3	0.4	16.	5.6	1.2				Repeated streptococcus infection on right leg with elephantiasis. Acute lymphangitis Acute nephritis.
19	17-2-05	32	M	M	86	7,100	65.6	3.2	13.6	16.	1.2	0.4			Bilh.Malaria Relaps acute.
"	20-2-05	"	"	"			74.	2.8	12.	10.4	0.4				Im full access.
"	26-2-05	"	"	"			62.6	6.	25.	6.4					Five days after.

Tables III and IV comprise subjects infected with schistosoma and uncinaria, and a perusal thereof will show that when both parasitisms coincide, the hematologic formula is modified and governed by the most aggressive parasite, which in the present case is the uncinaria. Eosinophilia is greater and the neutrophilic index much less.

Table V includes a series of 28 absolute counts of leukocytes in subjects infected with uncinaria and schistosoma. A higher figure than in cases of bilharziosis without parasitical anemia, is obtained.

Table VI refers to two subjects in whom bilharziosis was complicated with recurrent erysipelas and acute accesses of malaria. It shows the great modification produced by the febrile attack, decreasing the eosinophilia and increasing the neutrophile coefficient.

Table VII serves to show that intestinal bilharziosis, as already stated by me in previous publications,* does not conflict with regeneration of the blood in intense anemia. Subjects almost dead, having 9% of hemoglobin, and infected with *Schistosoma mansoni* and *Necator americanus,* saw their hemoglobin increase rapidly after the first doses of thymol, till the enviable figure of 100% was reached. And others also having intense uncinariasis and bilharziosis, and giving hemoglobinometric readings of 16 and 37%, reached 78 and 102, respectively, in 3 and 4 months.

*Bulletin of the Medical Association of Porto Rico, July 2, 1905. Page 110.

Table VII.

The Mayaguez Series of 1904-1905.

Males.

Rise in the hemoglobin percentage with the use of tymol in the treatment of bilharziosis complicate with uncinariasis.

Number of inscription.	Age	Hemoglobin at admission.	Hemoglobin when discharged.
6	35	73	83
7	22	54	45
8	39	45	55
15	34	37	102
43	21	48	46
44	29	68	85
59	24	39	
75	25	45	87
104	35	44	92
110	22	48	86
123	13	65	70
134	19	55	85
160	22	80	62
171	13	54	68
182	50	93	
185	45	90	92
69	21	47	86
221	20	62	95
215	27	70	70
225	25		99
229	25	44	88
240	16		
243	24	29	82
257	22		
266	25	41	52
268	25	34	51

The Mayaguez Series 1904-1905.
(continued) -2-

Number of inscription.	Age	Hemoglobin at admission.	Hemoglobin when discharged.
278	20	42	65
309	30	72	79
311	28	39	95
314	15	62	81
322	20	29	
333	25	48	87
334	25	19	55
335	21	24	40
336	30	66	81
346	19	37	105
353	22	82	83
768	23	88	
792	20	55	
2	60	15	Died
27	16	8	100
65	13	75	
367	11	78	94
370	11	76	98
380	9	69	
387	8	87	86
392	36	58	
411	30	41	87
413	40	56	76
415	27	88	88
422	38	98	
444	40	56	
461	30	24	38
493	36	26	78
517	19	10	Died
528	32	36	74
538	12	66	94
545	33	67	51

The Mayaguez Series 1904-1905.
(continued)

-43-

Number of inscription.	Age.	Hemoglobin at admission.	Hemoglobin when discharged.
559	19	66	90
567	35	60	90
585	20	30	87
588	29	16	78
601	21	75	85
623	16	60	90
625	20	32	77
655	17	26	57
665	50	60	91
669	20	94	
676	26	28	48
696	8	62	104
700	19	32	70
705	30	86	
715	19	60	70
717	16	77	108
724	15	82	
731	40		
735	13	55	70
748	30	65	73
753	11	92	
776	22	55	60
778	32	86	
790	20	105	
638	30	46	98
796	27	98	
798	41	41	
795	15		95
803	26	70	74
804	23		88
805	20	55	
739	25	25	60
638	22	39	85

Table VII.

The Mayaguez Series of 1904-1905.

Rise in the hemoglobin percentage with the use of tymol in the treatment of bilharziosis complicated with uncinariasis.

Females.

Number of inscription	Age	Hemoglobin at admission.	Hemoglobin when discharged
21	12	17	
31	26	50	76
53	28	17	40
68	28	77	97
87	25	50	56
94	12	48	90
99	22	85	
115	6	56	54
144	19	79	90
158	12	68	82
159	40	29	90
165	60	68	86
175	11	69	73
203	15	69	82
179	14	35	86
213	16	75	107
227	26	50	89
264	35	62	80
286	12	26	61

314	29	64	80
315	25	68	80
322	60	61	100
343	22	48	84
368	27	74	
426	12	69	86
432	11	62	97
435	20	50	98
437	40	66	85
248	16	60	79
455	45	96	
479	25	92	
535	28	69	88
537	27	87	87
586	18		88
618	19	85	89
633	25	45	75
692	39	45	80
699	24	87	
709	19	85	96
721	23	67	80
766	28	73	91
784	24	78	
794	24	84	
808	44	98	
809	28	69	

Table VIII.

The Mayaguez Series of 1904-1905.

Distribution of Bilharziosis according to sex and color.

Color	White	Mulatto	Negro	Total
Females	34	7	4	45
Males	77	12	2	91
Total	111	19	6	136

Table IX.

The Mayaguez Series of 1904-1905.

Distribution of Bilharziosis according to age and sex.

Ages	Males	Females	Total
Under 10 years	3	1	4
10 to 19 years	22	15	37
20 to 29 "	40	21	61
30 to 39 "	18	2	20
40 to 49 "	5	4	9
50 to 60 "	3	2	5
Total	91	45	136

Table X.

The Utuado Series of 1913.

Distribution of Bilharziosis according to age, sex and color.

AGES	SEXES						Unclassified	Grand Total
	Males			Females				
	White	Color	Total	White	Color	Total		
Under 10 years	15	2	17	6	5	11		28
10 to 19 years	26	7	33	35	22	57		90
20 to 29 "	19	3	22	26	10	36		58
30 to 39 "	9	0	9	12	2	14		23
40 to 49 "	3	0	3	5	0	5		8
50 to 59 "	0	0	0	4	4	8		8
60 to 69 "	0	0	0	0	0	0		0
70 to 79 "	0	0	0	1	0	1		1
Unclassified	1	0	1	1	1	2	1	4
Total	73	12	85	90	44	134	1	220

Table XI.

The Mayaguez Series of 1904-1905.

Parasites associated with bilharzia.

Parasites	Males	Females	Total
Bilharzia	91	45	136
Uncimariasis	76	30	106
Trichocefalus	54	25	79
Strongylhides	23	4	27
Ascarides	8	7	15
Distoma hepaticum	1	0	1
Tenia	1	1	2
Amebas	1	0	1
Oxyuris	5	0	5

Table XII.

The Utuado Series of 1913.

Parasites associated with Bilharzia.

Bilharzia---------- 220

Uncinariasis--------- 156

Ascarides---------- 91

Trichocefalus-------- 46

Strongyloides-------- 7

Table XIII

The Utuado Series of 1904

Name.	Date.	Age.	Sex.	Color.	Per cent hemoglobin.	Red cells per cmm.	Color index.	Leucocytes per cmm.	Percentage of Leucocytes.						Remarks.
									Poly-nuclears	Eosino-philes.	Lympho-cytes.	Mono-nuclears	Baso-philes.	Turck's cells. Myelo-cytes.	
I.N.	10-8-04	11	F	W	98	5,031,112	0.97	14,200	57.	8.8	27.2	5.6	0.4	0.4	Bilharzia, uncinaria.
G.S.	11-8-04	3	M	W	82	6,286,207	0.65	13,000	89.	14.	20.4	4.8	0.8		Bilharzia.
C.L.	9-8-04	22	F	W	85	5,702,116	0.74	12,000	51.2	13.2	31.2	4.	0.4		Bilharzia, uncinaria, syphilis.
J.N.	10-8-04	20	M	W	68	6,112,000	0.55	9,000	53.2	12.8	27.6	5.2	1.2		Bilharzia, uncinaria.
F.M.	12-8-04	11	M	W	116	4,794,380	1.21	16,200	50.	11.2	24.	13.6	1.2		Bilharzia, uncinaria.
P.G.	12-8-04	12	M	M	23	1,891,440	0.60	14,400	88.8	0.4	9.2	1.2	0.4		Bilharzia, uncinaria, tricho, ascaris, fasciola hepatica.
J.V.			M		51	5,581,116	0.44	16,600	43.6	13.2	37.6	4.8		0.8	Bilharzia, uncinaria.
C.M.	11-8-04	40	F	W	66				41.2	12.8	33.2	12.4	0.4		Bilharzia, tricho., metritis.

Symptomatology.—The symptomatology is very vague, there being nothing characteristic. In some cases the presence of the worm does not cause in the victim any functional changes subjectively perceptible. In others only a certain degree of constipation more or less accentuated is discovered, and slight pains are felt in the hepatic region. On rare occasions serious intractable diarrhea appears, as it does in common chronic enteritis. But the most constant morbid indication, that which constitutes the principal symptom of intestinal bilharziosis, *is the chronic, dysenteric, afebrile diarrhea,* accompanied by frequent painful dejections, tenesmus, and expulsion of white or sanguinolent mucus.

Clinical Features—In Porto Rico it is impossible to distinguish, according to the predominance of one symptom or another, three different clinical forms of intestinal bilharziosis, to-wit: (a) Moderate form; (b) Enterocolitic form; and (c) pseudodysenteric form.

(*a*) *Slight infections.*—Slight infections lack symptoms. They are unexpected laboratory discoveries made while examining feces for other purposes. They occur in persons seldom exposing themselves to contagion, and who afterwards never complain of abdominal pains or attacks of diarrhea. The general health of such persons is good, their hemoglobin is normal, and if it were not for the disclosure made by the microscope no one could suspect the existence of schistosomiasis. This form is frequent in Porto Rico—more so than would be supposed at first sight. My Mayaguez series comprises a large number of well to do patients, especially among the women; and the Utuado series, which all the members of the Institute of Tropical Medicine and Hygiene studied carefully from this point of view, shows 97 out of 220 recorded cases, or 44%, in which there was a total absence of symptoms.

(*b*) *Bilharzian enterocolitis.*—Bilharzian enterocolitis is characterized by absence of diarrhea and presence of constipation of moderate intensity. The excrement is hard and caprine, and enclosed in mucus which is at times sanguinolent. Moderate intestinal colic and slight pains in the hepatic region or in the epigastric cavity are also frequent. The appetite remains good, digestion is normal, general health hardly suffers, or continues to

be excellent, and the hemoglobin remains high. Many cases clinically diagnosed as chronic mucomembranous enterocolitis are nothing but intestinal enterocolitic bilharziosis, which circumstance should be borne in mind in tropical countries infested by *Schistosoma mansoni.*

The frequency of this form reached 14.5% in my Utuado series.

(*c*) *Bilharzian pseudodysentery.*—Bilharzian pseudodysentery was described by Firket[25] in 1897. It is considered as the typical form of intestinal bilharziosis, because it is the form which best responds theoretically to the aggregate of anatomopathological changes observed in corpses. It is distinguished from true amebic or bacillary dysentery because there is no acute febrile stage, and because it becomes chronic from the beginning, with frequent attacks of intestinal colic accompanied by mucous or mucosanguinolent stools, generally from 4 to 6, every 24 hours, but which may reach 12 and 15 a day. Tenesmus is generally moderate and coincides with a troublesome sensation of weight in the inferior portion of the rectum accompanied by a burning pruritus of the sphincter ani and congestion of the hemorrhoidal veins. There appear, besides, moderate sordes gastricæ, and the appetite diminishes.

The acute attack lasts 4 or 5 days, but calms rapidly under a milk or lactohydrocarbonate diet, and certain saline laxatives, but it recurs by reason of some dietary disorder, or provoked by the ingestion of certain excitant condiments, or of some metallic medicament, such as iron or arsenic.

In my Utuado series the frequency of this form was 40.9%. Ninety-one cases out of the 220 showed dysenteric symptoms. This was corroborated in Mayaguez among the laborers.

Diagnosis.—Only the microscope can establish a positive diagnosis, free from doubt. Hence the imperative necessity in tropical countries of systematically examining the dejections of persons suffering from diarrhea and dysentery; for it must not be forgotten that other parasitic diseases such as uncinariasis, anguilluliasis, tricocephaliasis and balantidiasis, may cause the dysenteric syndrome.

The technic of the microscopic examination is very simple. It does not require special knowledge. It is sufficient to place a

particle of excrement on the slide and to press it lightly with a No. 1 or No. 2 cover glass, until it spreads into a thin layer. The mucus enclosing the fecal matter should be preferred, but if it does not appear a portion of the external layer of the scybalum may be used. When the excrement is very hard and dry it must be dampened with urine, ascitic, hydrocelic, or any other organic fluid, but water must not be used for it provokes the dehiscence of the egg, and, therefore, makes observation more difficult. If by this means success is not achieved, then the method of Yaoita must be resorted to. This method consists in dissolving a portion of feces in a combination of equal parts of antiformin and ether, and centrifugalizing it. The antiformin disgregates the hard excrement and permits the sedimentation of the eggs of schistosoma and other parasites.

Only in exceptional cases determined by lack of apparatus for observation, may a studious physician with a profound knowledge of intestinal schistosomiasis and other parasitic affections, venture a clinical diagnosis of bilharzian pseudodysentery, after a careful examination of the subject and a study of his commemorative signs in connection with the location of his residence ad place of labor.

Prognosis—Up to the present time schistosmiasis has been benign in Porto Rico. Forty-four per centum of the persons infested suffer no trouble at all. The general health is not impaired. Sanguineous regeneration in intense uncinariasis treated by thymol is not delayed by the presence of schistosomiasis. And those who protect themselves against re-infestation, cure spontaneously in the course of years, as happened in one of my cases from Aguadilla, cured ten years after diagnosis.

Although I have referred in this paper to two cases of bilharziosis upon whom I performed autopsies, and to another who died a few days after examination, I must state that they died of intercurrent diseases and not of schistosomiasis. One died of pellagra, another of heart failure, and the third of intense uncinariasis.

Because of its long duration—up to thirty years, according to some—this disease, although benign, is of serious prognosis.

Treatment—The treatment is purely symptomatic-- mild saline laxatives, and opiated pills with extract of hydrastis and

ipecac during the acute attacks. Against the schistosoma there is nothing to recommend. Salvarsan, neosalvarsan, atoxyl, aspidium, filix-mas, and other less important drugs, failed in my hands.

Prevalence and Distribution in Porto Rico.—Schistosomiasis prevails on the coasts of the island, and in those lowlands and valleys of the interior where cane is cultivated. Favorable shelter is offered thereto by river margins, swampy lands, small lakes, pools and ditches. It has been found in the North, in the East, in the South and in the West, and in the basins of the large rivers. On the dry lands where coffee is cultivated—although they may be near the coast—and in the mountain regions, there are no endemic centers.

We must except Utuado, however, which, notwithstanding its being in the center of the island and surrounded by mountains, constitutes a seriously threatening focus.

In 1904 the first Anemia Commission of Porto Rico recorded 21 cases out of 5,000 anemia patients examined by them, and in 1913 the Institute of Tropical Medicine of Porto Rico, as a member of which I worked there, recorded out of its 10,140 patients, 320 cases of intestinal bilharziosis.

The reason for the existence of this endemic focus in the center of Porto Rico is explained by the following circumstances: (*a*) The town of Utuado was founded in a damp valley crossed by two large rivers contaminated by human dejections. (*b*) Many years prior to the emancipation of slaves, the bottom and low lands surrounding the town and adjacent to the rivers, were cultivated to cane and rice. (*c*) During the existence of slavery, West African negroes purchased on the coast were imported, and they possibly scattered the eggs of the parasite in the regions at present contaminated which are precisely those nearest the town.

The 136 cases of the Mayaguez series gave a contingent of 99, or 73.3%, for the rural zone. Thirty-two cases, or 22.2%, corresponding to the town, and the rest, or 4.45%, to other municipalities. This includes one case from Santo Domingo. It is important to point out that in one sole district of the town 23 cases were recorded, and that this district is contiguous to the swampy zone where, without question, the two cases mentioned in my first monograph became infested.

The distribution of bilharziosis in regard to the sex, age and color of the patients, is summarized in Tables VIII, IX and X. The Mayaguez series, which comprises Tables VIII and IX, shows 91 males as against 45 females, or 67.4 and 32.6%, respectively, and that of Utuado, on the contrary, gives 85 males as against 135 females, or 38.64 and 61.36%, respectively.

The marked difference and even the contrariety discovered in the distribution of the disease among the sexes of the two tables, is immediately noticeable. There is nothing particular in the contrast, and its explanation is very simple. In Mayaguez, women do not engage in agricultural labor, nor do they wash clothes on the river margins, but in laundries within the city limits, being, therefore, much less exposed than men, who cultivate the soil and go barefooted about the swampy lands. In Utuado, on the other hand, women cultivate the soil as do the men. They wash clothes on the margins of rivers infested by the dejections of almost all the inhabitants of the town, and also bathe in these rivers. Their exposure is perhaps greater.

Intestinal bilharziosis has no predilection for any determined race. Its frequency is shown in my statistics in relation to the proportion of patients of each race that visited our dispensaries —111 whites, 19 mulattoes and 6 negroes in Mayaguez, and 163 whites and 56 colored patients in Utuado.

The distribution according to age shows that in both series the ages of greatest exposure are from 10 to 39 years.

Conclusions.

From the foregoing study we may arrive at the following conclusions:

1. Intestinal bilharziosis is a disease naturalized many years since in the Antilles and other regions of the American continent.
2. Evident demonstration of its occurrence in natives of **America was not established until 1904, when I presented my first two cases to the Medical Association of Porto Rico.**
3. Papers on bilharziosis published in America prior to mine, **all refer to bilharzian hematuria produced by Schistosoma hematobium.**
4. The living agent of intestinal bilharziosis is the *Schistosoma mansoni*, the female of which lays lateral-spined eggs different from those of *Schistosoma hematobium.*

5. *Schistosoma mansoni* and *Schistosoma hematobium* are distinct species introducing different diseases, having special geographical distribution.

6. *Schistosoma mansoni* was imported into the Antilles and America, by West African negroes.

7. In over 300,000 persons examined by the members and subaltern personnel of the Anemia Commissions of Porto Rico and of the Institute of Tropical Medicine and Hygiene, it has been impossible to find one single case of bilharzian hematuria, notwithstanding the tenacity and interest with which it has been sought.

8. Intestinal bilharziosis has spread around the entire coast of the island, and prevails in the zones where cane is cultivated and in the valleys crossed by large rivers.

9. The infection of the inhabitants of each district is more or less intense according to the extension of the endemic centers. Thus Utuado, with a small focus, has an index of 2.16%, while Mayaguez, with extensive bottom lands and numerous swamps, gives an index of 8.4%.

10. Intestinal bilharziosis has no predilection for race, sex or age. It attacks all those exposing themselves to contagion.

11. Although in the majority of cases the parasite entered through the skin, it is undeniable that certain subjects could not have been infested otherwise than through the alimentary canal.

12. The clinical features of intestinal bilharziosis in Porto Rico are the following: (a) Slight form, with a frequency of 44%. (b) Pseudodysenteric form, with a percentage of 40.9. (c) Enterocolitic form with 14.5%.

13. Even in its most serious form it determines but slight anemia. Moreover, it does not oppose regeneration of the blood in intense anemia, as established by cases of mine wherein the hemoglobin increased from 9% to 100.

14. Intestinal bilharziosis determines slight changes in the globular compositon of the blood, which are characterized by moderate leukocytosis, eosinophilia and mononucleosis.

15. There is no pharmacologic curative treatment therfor.

16. Benign infections of subjects who abandon endemic centers, cure spontaneously in a period never less than ten years.

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NEWS AND COMMENT.

THE ATTAKAPAS CLINICAL SOCIETY held a very successful meeting in Crowley on October 3, with an attendance of about thirty-five. Dr. L. B. Crawford, of Patterson, presided, and Dr. W. F. Carstens, secretary-treasurer, was at his post. The session began at 2 p. m. with a clinic at the Crowley Sanitarium, under the auspices of Dr. E. M. Ellis. Many interesting cases were shown and discussed, the modern sanitarium was visited and lunch was served. Shortly after, at about 5 p. m., the scientific program was begun at the Elks' Home. Papers were read by Drs. Chassaignac, Gessner and Butterworth, of New Orleans; Dr. Young, of Rayne, and Dr. Faulk, of Crowley. All were pretty thoroughly discussed and, after a short business session, all adjourned to the Egan Hotel for the supper tendered by the society to its members and guests.

The place selected for the next meeting is Jennings, the representatives of two or three other towns withdrawing them, as no meeting was ever held in Jennings previously.

THE NAVAL MEDICAL SCHOOL.—This school opened at Washington, D. C., September 29, with eighteen students, the assistant surgeons, Medical Reserve Corps, composing the class entering at that time.

ARMY MEDICAL SCHOOL INSTUCTORS.—The officers of the Medical Corps who were ordered to duty in the faculty of the Army Medical School, Washington, D. C., for the session beginning October 16, are: Col. William O. Owen, professor of medical department administration; Lieut. Col. Champe C. McCulloch, Jr., professor of military hygiene; Major Carl R. Darnall, professor of sanitary chemistry; Major William H. Moncrief, professor of operative surgery, and Capt. Philip W. Huntington, professor of roentgenology. The Army Medical School, formerly located at 721 Thirteenth Street, N. W., has been transferred to 462 Louisiana Avenue.

ANTHRAX IN SHAVING BRUSHES.—A number of cases of anthrax due to shaving brushes has come to light recently in London. The infection was traced to a cheap horsehair shaving

brush, described as having black japanned wooden handles and a thin brush of white hair, and manufactured in Japan. Neighboring towns of London and other places received large parcels of these brushes and a warning was sent out by the Local Government Board to the health officers in each of the towns receiving them.

SILLIMAN LECTURES AT YALE.—The Silliman lectures at Yale University were delivered this year by J. S. Haldane, M. D., LL.D., F. R. S., October 9-13. The subject was "Organism and Environment as Illustrated by the Physiology of Breathing."

COURSE OF LECTURES.—New York Skin and Cancer Hospital announces that Dr. L. Duncan Bulkley, assisted by the attending staff, will give the eighteenth series of "Clinical Lectures on Diseases of the Skin," beginning November 1, 1916. The lectures will be free to the medical profession on presentation of their professional cards.

LACK OF FUNDS MAY CLOSE HOSPITAL.—It is announced that the New York Ophthalmic Hospital may be compelled to close its doors for lack of funds, because of the falling off of subscriptions since the beginning of the war. Two of the free clinics for children have already been closed and it is feared further curtailment of the work will be necessary.

MURPHY FIELD HOSPITAL DISBANDS.—The field hospital organized by Dr. John B. Murphy as the Chicago medical unit, and forming a part of the general field hospital of the British expeditionary force in France, has been disbanded because of Dr. Murphy's death. The unit won the Royal Red Cross medal and was twice mentioned in dispatches for effective work.

MEETING OF THE SOUTHERN MEDICAL ASSOCIATION at Atlanta, Ga., November 13, 14, 15 and 16 will be held in Atlanta's Auditorium Armory, located near the principal hospitals of the Atlanta Medical School, in which clinics will be held every morning from 8 to 10 by distinguished clinicians from sixteen States. All railroads east of the Mississippi comprising the Southeastern Passenger Association have already granted reduced rates.

GROWTH OF THE A. M. A.—According to Secretary Alexander R. Craig, of the American Medical Association, the membership

of that association is now 78,301, and shows a gain of 2,300 over last year.

CHANGE IN TEXAS MEDICAL NEWS.—Dr. M. M. Smith, of Dallas, editor of the *Texas Medical News,* announced recently the change of his journal to a national journal, which will be devoted to the interest of medical life insurance and health conservation.

NEW ORLEANS RECORDS LOWEST DEATH RATE.—The death rate of New Orleans for September was the lowest in one hundred years. The white death rate was only 11.96, but the negro rate was 25.65. The rate is always augmented by the deaths in the Charity Hospital and other institutions where patients are received from the surrounding country. Accordingly, with the non-residents excluded, the true rate for the city was found to be 10.69 for whites and for negroes 22.12, or a total of 13.79. The total number of deaths in New Orleans for September was 493.

TUBERCULOSIS WEEK.— December 3-10 is "tuberculosis week," and it is the desire of the National Association for the Study and Prevention of Tuberculosis that this be made the banner year in constructive and effective work. Now is the time to prepare for this important time and occasion, in order that results may be more satisfactory than heretofore. If, according to expert opinion, tuberculosis can be stamped out in twenty years, it is necessary that each one do his part to help eradicate this dread disease.

ASSOCIATION FOR THE STUDY OF INTERNAL SECRETIONS.— This association was recently inaugurated with the object of correlating the work of the physicians and other students of this phase of medicine in the different parts of the world. Libraries are to be established and a scientific bulletin published to contain a resume of the work being done in this important line. The charter membership includes nearly three hundred physicians in every branch of medical practice. The association desires those who have contributed articles pertaining to one phase or another of the study of internal secretions to send six copies each of their reprints to Dr. Henry R. Harrower, Los Angeles, Cal.

These will be catlogued, cross-indexed and made available in six different medical centers.

JUBILEE OF PARKE, DAVIS & COMPANY.—The house of Parke, Davis & Company recently celebrated its golden jubilee. In a little pamphlet entitled JUBILEE SOUVENIR a complete history of the company is given, from the time of its establishment in 1866 to the present day. It is now ranked as one of the largest and best known firms in theworld . It not only has branches in a great many of the large cities of America, but reaches out to foreign countries, and is represented in Montreal, London, Petrograd, Bombay, Buenos Ayres and Argentine and Havana.

MEETING OF OBSTETRICIANS.—The twenty-ninth annual convention of the American Association of Obstetricians and Gynecologists was held in Indianapolis September 25-27 and the following officers were elected: President, Dr. John W. Keefe, Providence, R. I.; vice presidents, Drs. Thomas Reeder, St. Louis, and Charles L. Ill, Newark, N. J.; secretary, Dr. E. Gus tave Zinke, Cincinnati (re-elected), and treasurer, Dr. Herman E. Hayd, Buffalo.

SOUTH TEXAS DISTRICT MEDICAL ASSOCIATION MEETING.—The fortieth semi-annual meeting of the South Texas District Medical Association was held at the Holland Hotel, Orange, Tex., October 5 and 6, with Dr. E. A. Malsch, of Victoria, presiding. Drs. S. M. D. Clark and Isadore Dyer, of New Orleans, attended the meeting and read papers. The meeting was a most enjoyable and profitable one, both socially and scientifically.

PRESBYTERIAN HOSPITAL REPORT.—The September report of the New Orleans Presbyterian Hospital shows a total of 304 patients in the institution during the month, which broke all records. There were 40 patients in the hospital at the beginning of the month and 264 patients admitted during the month.

WASTE PAPER SOLD FOR TUBERCULOSIS BENEFIT.—During the last six months the St. Louis Tuberculosis Society collected and sold nearly 1,000,000 pounds of waste. New Orleans should have no difficulty in collecting that amount and more in the same length of time and putting the proceeds to some good account.

RECEIVES PRIZE FOUR TIMES.—The Elbert prize was awarded for the fourth time, by the American Pharmaceutical Association, to Prof. John Uri Lloyd, for his discoveries in the colloidal precipitation of alkaloids by Fuller's earth.

DISEASE COSTLY.—At a meeting of the American Chemical Society, held in New York recently, it was stated that this country is losing close to one billion dollars a year through preventable occupational diseases, in spite of the better-working-conditions' movement. Dr. W. A. Lynott, of the Federated Bureau of Mines, read a paper before the meeting which contained statistics that every workers in the United States loses an average of nine days' work a year through occupational diseases that could be prevented by the use of proper machinery and thorough sanitation.

CESAREAN TRIPLETS.—According to a press report, the first instance of the delivery of triplets by the Cesarean method took place at the Providence Hospital in Holyoke, Mass., some time in September. The babies, who are all apparently vigorous, are two girls, weighing six pounds each, and a boy weighing five pounds, twelve ounces.

LOUISIANA STATE BOARD OF MEDICAL EXAMINERS.—The next meeting of the Louisiana State Board of Medical Examiners will be held November 30 and December 1 and 2 at the Hutchinson Memorial Building, 1551 Canal Street.

PERSONALS.—Dr. Earl Peck, first assistant resident physician at the Municipal Hospital in Philadelphia, who had attended hundreds of stricken children, died September 5, from infantile paralysis.

Dr. James A. Bethea, who has been on duty all summer in the Medical Reserve Corps at Fort Sam Houston, successfully passed the Army Board examination on July 14 and has been ordered to the Army Medical School at Washington, D. C.

Among the doctors from New Orleans who have returned recently from their vacations and resumed practice are: Drs. F. W. Parham, E. D. Martin, Milton A. Schlenker, I. McIlhenny, John F. Dicks, Thomas B. Sellers, W. W. Butterworth and George S. Bel.

Dr. Isadore Dyer attended the first examination of the National Board of Medical Examiners, held in Washington, October 16 to 21. Of ten candidates five passed.

Dr. C. Jeff Miller attended the meeting of the Clinical Congress of Surgeons held in Philadelphia, October 23-28.

Drs. Charles Chassaignac and W. W. Butterworth were visitors at the meeting of the Attakapas Clinical Society held in Crowley, October 3.

REMOVALS.—*Journal of the Michigan State Medical Society,* from 91 Monroe Avenue, to 513-522 Powers Theater Building, Grand Rapids, Mich.

Dr. Allen Johnson, from McGregor, Tex., to German Hospital, San Francisco, Cal.

Dr. J. T. Weeks, from Bremond to Cleveland, Tex.

Dr. A. J. Bryant, from Newellton, La., to Little Rock, Ark.

Dr. C. B. Alexander, from Downey to Alhambra, Cal.

Dr. V. K. Allen, from Illinois Central Hospital to Lecompte, La.

The following removals have taken place in New Orleans:

Dr. J. M. Elliott, from 201 Medical Building to 1229 Maison Blanche Building.

Dr. A. J. Montz, from 209 Macheca Building to Dumaine and Rampart Streets.

Dr. J. Leon Lewis, from 709 to 421 Macheca Building.

Dr. S. W. Stafford, from 711 Macheca Building to Charity Hospital.

Dr. John R. Hume, from 518 to 311 Macheca Building.

Drs. C. A. M. Dorrestein, Ramon A. Oriol and Harold J. Gondolf, from 822 Audubon Building to 1226 Maison Blanche Building.

Dr. S. P. Delaup, from 412 to 201 Medical Building.

Dr. Robert Bernhard, from 711 Macheca Building to 412 Medical Building.

Dr. W. D. Phillips, from 416 Medical Building to 1201 Maison Blanche Building.

Dr. A. McShane, from 701 to 614 Macheca Building.

Drs. J. G. Hirsch, M. A. Shlenker and William Kohlmann, from 1201 to 1217 Maison Blanche Building.

Dr. J. Fred Dunn, from 1218 Maison Blanche Building to 711 Macheca Building.

Dr. J. M. Hountha, from 105 Medical Building to 711 Macheca Building.

Dr. E. A. Bertucci, from 710 to 1226 Maison Blanche Building.

Dr. H. P. Jones, from 1205 to 1203 Maison Blanche Building.

Drs. O. W. Bethea, J. T. Halsey, C. N. Chavigny, George K. Pratt, Jr., and Solon G. Wilson, from 1232 to 203 Maison Blanche Building

Dr. Henry P. Daspit, from 1226 to 1225 Maison Blanche Building.

Dr. John Smyth, from 1217 to 1141 Maison Blanche Building.

Dr. E. M. Hummel, from 1226 to 1222 Maison Blanche Building.

Dr. S. C. Jamison, from 1217 to 1232 Maison Blanche Building.

Dr. R. J. Mainegra, from 701 Perrin Building to 1109 Maison Blanche Building.

Dr. J. E. Landry, from 1232 to 1126 Maison Blanche Building.

Dr. T. B. Sellers, from 724 Baronne Street to fourth floor Cusachs Building.

Dr. J. T. Scott, from 1228 Maison Blanche Building to 602 Perrin Building.

Dr. Lucien A. Fortier, to 1106 Maison Blanche Building.

Dr. George Dempsey, from 709 to 702 Macheca Building.

Dr. E. A. Overbay, from 509 to 306 Macheca Building.

Dr. P. G. Lacroix, from 1232 Maison Blanche Building to 701 Perrin Building.

MARRIED.—On October 24, 1916 Dr. Charles Shupte Holbrook, of Jackson, La., to Miss Marie Louise Hertzog, of Derry, La.

BOOK REVIEWS AND NOTICES

All new publications sent to the JOURNAL will be appreciated and will invariably be promptly acknowledged under the heading of "Publications Received." While it will be the aim of the JOURNAL to review as many of the works accepted as possible, the editors will be guided by the space available and the merit of respective publications. The acceptance of a book implies no obligation to review.

Venesection. A Brief Summary of the Practical Value of Venesection in Disease. By Walton Forest Dulton, M. D. F. A. Davis Co., Philadelphia.

Although it purports to be a "Handbook of Venesection" this book devotes much space to matters that have nothing to do with the history, technic or indications of blood letting. A great deal of its matter, therefore, would better have been relegated to a treatise on general medicine or therapeutics. On the whole the case of blood-letting is well put and this volume may be welcomed as spreading the teaching that venesection should be revived and accorded its rightful place as one of our most therapeutic procedures. It is to be regretted that this author has been inclined (as do nearly all others writing upon this subject) to make exaggerated claims for venesection and to suggest its application in conditions where, to say the least, its use is of doubtful value. Such a policy naturally tends to diminish the consideration which should be accorded blood-letting in its proper sphere.

Lemann.

A Manual of Practical Laboratory Diagnosis. By Lewis Webb Hill, M. D. W. M. Leonard, Boston.

This little manual is very practical and the methods it sets forth have been well chosen and clearly and concisely described. It fulfills its purpose of providing a pocket reference book for students and internes so that they may be saved "the trouble of hunting through all the various alternative methods of performing a test given in most of the larger books."

Lemann.

The Diagnosis and Treatment of Heart Disease. Practical Points for Students and Practitioners. By E. M. Brockbank, M. D., F. R. C. P. 2nd Edition. Paul Hoeber, New York.

The author has brought into small compass the essentials of the physical diagnosis of heart conditions. His descriptions are clearcut and easily understood. This little manual can be

used with profit in classes of physical diagnosis. The section on treatment is too brief to amount to more than the merest outline.

Lemann.

Clinical Disorders of the Heart. A Hand Book for Practitioners and Students. By Thomas Lewis, M. D., D. Sc., F. R. C. P. 3rd Edition. Paul Hoeber, New York.

The appearance of the third edition of Lewis' little book setting forth the basis for the recognition of the various types of cardiac irregularities gives evidence of the prompt recognition of its importance by the profession. The contributions of the English School of cardiologists are just beginning to be incorporated into our general text books of medicine and the treament they are sometimes accorded there is inadequate. The subject is so important, the facts presented in this little treatise are so fundamental, and the treatise itself is so short that every well informed doctor should read it.

Lemann.

Modern Medicine and Some Modern Remedies. By Thomas Bodley Scott. Paul Hoeber, New York.

This little book contains four essays on: Disorders of the Heart, Arteriosclerosis, Therapeutics, Speculations and Doubts, Chronic Bronchitis and Bronchial Asthma. It was written by a general practitioner for general practitioners and its spirit as well as its aim is eminently practical rather than speculative or theoretical. The author has based much, in fact most, of his recommendations upon the solid basis of the latest facts of the science of medicine and so has brought art and his science in correlation. Many times, however, he becomes a rank empiricist and some of the applications of the newer remedies smack of pseudo science. The style of the author is clear and all the lectures are interesting and worth reading.

Lemann.

Diseases of the Skin, by Richard L. Sutton, M. D., C. V. Mosby Co., St. Louis.

There are a number of good text and reference books on skin diseases, but this work of Sutton will be generally considered as an addition to American dermatology. While conforming to the general scheme of the best of recent text books, there is much of originality in the presentation of the subject. The chapters on diagnosis and treatment particularly go into illustrative detail which can only help the student of dermatology. As for the general text, it is comprehensive and practical and carries a large number of illustrations, all of which

are evidently original and derived from many sources. The author has been generous in his quoted references, including much of the work of American dermatologists. The more exotic diseases are presented in sufficient length to give a summary of present information and this feature will add to the value of the book as a reference.

The style of the author is frank and clear and the work is altogether creditable when its pretentions are considered.

Dyer.

Mentally Deficient Children. Their Treatment and Training, by G. E. Shuttleworth, B. A., M. D. and W. A. Potts, M. A., M. D. Fourth Edition. P. Blakiston's Son & Co., Philadelphia.

The present edition of this valuable little book has been entirely revised in all its divisions. Since the first edition (1895), many phases of defective or "exceptional" children have undergone several revolutions, until today the whole field is newly outlined. The book in review has satisfied these changes and now presents the modern conception of the whole subject. The historical review of the study of deficient children is especially noteworthy. The material is excellently arranged and is thorough in the detail undertaken.

Dyer.

Skin Cancer, by Henry H. Hazen, A. B. M. D., C. V. Mosby Co., St. Louis.

There has been a long desideratum for a comprehensive book on skin cancer and we are glad Dr. Hazen has given us such a book. Skin cancer ordinarily has had so small a significance that it is worth while to find a work of pretentious proportions presenting several kinds and numerous varieties.

While the book will be valuable to those who want a careful and detailed differentiation of types of skin cancer and their diagnosis and treatment, there is still so much of educational importance in the work that the general practitioner should not miss the chance to become informed upon a subject to which he now confesses so large ignorance.

The pathology of each form of skin cancer is well given and the theories of cancer origin are discussed. Much detail is shown in differential diagnosis, and the excellent illustrations are of large service to this end.

Remedial care of cancer is fully covered, including many surgical procedures, some of which are aptly illustrated.

Altogether a timely and valuable contribution.

Dyer.

Harvey's Views on the Use of the Circulation of the Blood, by John G. Curtis, M. D., LL. D. Columbia University Press, New York.

Dr. Frederick S. Lee, Professor of Physiology at Columbia, has undertaken the editing of the work of Dr. Curtis and the gratitude of the medical profession should be extended him for his successful endeavor. As he states in an editorial note, the work is of one "who from the background of the physiological science of today delighted in mastering the ideas of the fathers of modern physiology. If his work is to be summarized in a single sentence, it may be said that he has shown Harvey to be a disciple more of Aristotle than of Galen. * * * Harvey's true position in the world of physiological thought has not before been made known. Herein lies Professor Curtis' contribution to the history of this science!"

The book itself is a rare literary treat, aside from its value as a careful and analytical review of Harvey's development of an evolutionary stage of medical thought. It hardly admits of brief review, for it deserves to be read by all medical men, who respect the foundation of the science which embraces modern medicine.

Dyer.

The Endemic Diseases of the Southern States, by William H. Deaderick, M. D., and Loyd Thompson, M. D. W. B. Saunders and Co., Philadelphia and London.

Malaria, blackwater fever, pellagra, amebic dysentery, hookworm and other intestinal parasites are discussed in this work, which contains over five hundred pages of material. Deaderick has again presented a masterly article on malaria covering all the modern information on this subject. This takes up nearly half the book, and it stands out as the best of the book, for the reason that it carries so much of the original work of the author.

Thompson contributes the article on pellagra and amebic dysentery jointly with Deaderick. These two subjects are reviewed and brought up to date, as are the other divisions of the work. The authors state that they are really only aiming at some of the endemic diseases in the South and in this their book is of service. The amount of material presented and the evidence of care displayed in compiling so much from so many sources bespeak the favorable reception of the book; besides, it is so full of valuable information that it may well serve for reference upon the topics included in its covers.

Dyer.

The International Medical Annual. A Year Book of Treatment and Practitioners' Index. 1916. Thirty-fourth year. Wm. Wood & Co., New York.

This encyclopedic volume presents a wonderful mass of information derived from universal sources and compiled and annotated by a group of the best of modern physicians and surgeons, many distinguished in the special fields of their contributions.

Dyer.

Diseases of the Eye, a Handbook of Ophthalmic Practice for Students and Practitioners. By George E. de Schweinitz, M. D., LL. D. (Pa.). W. B. Saunders Co., Philadelphia and London. 1916.

For more than twenty years de Schweinitz's work on the Eye has been a standard text-book on Ophthalmology. The constant advances made in that branch of medicine quickly make a good book obsolete. De Schweinitz's treatise has never been allowed to become antiquated, but, by repeated revision and enlargement, it has always sustained its claim to being a complete and systematic reflex of contemporaneous ophthalmologic practice. Among the new matter incorporated in this edition we may mention: Clifford Walker's method of testing visual field; squirrel plague conjunctivitis; swimming bath conjunctivitis; anaphylactic keratitis; family cerebral degeneration with macular changes; ocular symptoms of disease of the pituitary body; sclereotomy with a punch; preliminary capsulotomy; iridotasis; thread drainage of the anterior chamber; extraction of cataract in the capsule after subluxation of the lens with capsule forceps; capsulomuscular advancement; tenotomy of the inferior oblique; window resection of the nasal duct.

It is unnecessary to give an outline of the subjects discussed in de Schweinitz's work, since such an outline itself would have to embrace the entire domain of ophthalmology.

The author himself has done the revising, and by industry and careful sifting of periodical literature he has succeeded in retaining its claim on the consideration of the medical world as a full, systematic exposition of modern ophthalmology.

McShane.

Practical Medicine Series. Vol. III. Eye, Ear, Nose and Throat. Edited by Casey A. Wood, M. D.; Albert H. Andrews, M. D.; George F. Shambaugh, M. D. Series 1916. The Year Book Publishers, Chicago.

We have had the pleasure of noticing previous numbers in this valuable series of year books. The ten volumes that con-

stitute the year's output of condensed medical progress in all branches of medical science give the general practitioner a faithful summary of the useful new work done in the entire field of practical medicine. Although the volumes are intended primarily for the general practitioner, still the specialist in each can, by selecting the appropriate volume, find, in brief compass, a summary of the substantial progress achieved in his particular line. The present volume abounds in matter relating to injuries of the eye, owing to the Pan-Europen war, where shrapnel and high explosives are playing havoc with the ocular apparatus. The present number sustains the high character of the series.

McShane.

International Medical Annual, 1915. Published by William Wood and Company, New York.

In spite of the great war, the thirty-third annual issue of this well-known year book of treatment and practitioner's index was produced. Are noted: Special articles on Naval and Military Surgery; but, as usual, most careful consideration has been given to each department of medicine and surgery.

Articles deal with alterations and additions of the new edition of the British Pharmacopoeia.

A new and more prominent type for this issue has been adopted which renders it easier to read.

E. M. D.

Refraction of the Human Eye and Methods of Estimating the Refraction. By James Thorington, A. M., M. D. P. Blakiston's Son & Co., Philadelphia.

Under this single title are grouped three different works by the same author: "Refraction and How to Refract," "Prisms" and "Retinoscopy." Thornton's work on refractive errors has long been a standard text-book. His little handbook on Retinoscopy is a complete practical exposition of the subject. The author's aim has been to supply beginners in Ophthalmology with an accurate guide, while leaving out the abstruse mathematical calculations that abound in Sanders' classical treatise. Thorington is systematic and practical. He takes the student through the laws of optics; then the standard emmetropic eye is studied, and finally all kinds and conditions of ametropia are described and methods of correcting them fully set forth.

Some matter that has fallen into disuse has been deleted, and all useful new matter has been incorporated in the text. It may be of interest to note that Thorington's original work

on "Refraction and How to Refract" received the compliment of being translated into Chinese in 1914.

The recent improvements introduced into Thorington's work assure it of a continuance of the popularity and esteem it has always enjoyed.

McShane.

The Medical Clinics of Chicago. Vol. I. No. 1. July, 1915. Vol. I. No. 2. September, 1915. Vol. I. No. 4. January, 1916. Vol. I. No 5 March, 1916 Published by W. B. Saunders Company, Philadelphia and London.

These books are published bi-monthly, six numbers a year. They are clinics held in the great hospitals of Chicago and contribute a most flattering proof of the advancement of medicine in America.

It would be worth while owning the sequence of the numbers as they are published.

E.M. D.

PUBLICATIONS RECEIVED

LEA & FEBIGER. Philadelphia and New York, 1916.

Progressive Medicine. Edited by Hobart Amory Hare, M. D., and Leighton F. Appleman, M. D. September 1, 1916.

Diseases of Children, by Edwin E. Graham, A. B., M. D.

J. B. LIPPINCOTT COMPANY. Philadelphia and London, 1916.

Care and Feeding of Infants and Children, by Walter Reeve Ramsey, M. D., including suggestions on nursing, by Margaret B. Lettice and Nann Gossman.

International Clinics. Volume III. Twenty-sixth Series, 1916.

THE YEAR BOOK PUBLISHERS. Chicago, 1916.

The Practical Medicine Series. Volume IV: **Gynecology.** Edited by Emilius C. Dudley, A. M., M. D. and Herbert M. Stowe, M. D. Series 1916. Volume V: **Pediatrics.** Edited by Isaac A. Abt, M. D., with the collaboration of A. Levinson, A. M., M. D. **Orthopedic Surgery.** Edited by John Ridlon, A. M., M. D., with the collaboration of Charles A. Parker, M.D.

P. BLAKISTON'S SON & COMPANY. Philadelphia, 1916.

A Text-Book of Human Physiology, including a section on **Physiologic Apparatus,** by Albert P. Brubaker, A. M., M. D. Fifth edition, revised and enlarged.

SURGERY PUBLISHING COMPANY. New York, 1916.

The American Year-Book of Anesthesia and Analgesia, by F. H. McMechan, A. M., M. D.

F. A. DAVIS COMPANY. Philadelphia and London, 1916.

A Practical Treatise on Disorders of the Sexual Function in the Male and Female, by Max Huhner, M. D.

WASHINGTON GOVERNMENT PRINTING OFFICE. Washington, D. C., 1916.

United States Naval **Medical Bulletin.** October, 1916.

Report of the Department of Health of the Panama Canal. July, 1916.

Bacteria in Commercial Bottled Waters, by Maude Mason Obst. United States Department of Agriculture.

Hay Fever and Its Prevention, by W. Scheppegrell, M. D. **Public Health Reports.**

Public Health Reports. Volume XXXI, Nos. 29, 30, 31, 32, 33, 34, 35, 36, 37, and 38.

Report of the Department of Health of the Panama Canal. June, 1916.

The Sanitary Progress and Vital Statistics of Hawaii. (Prudential Press, Newark, N. J.)

Die Schwarzen Sporen (black spores), bei der **Malarianinfektion im Mucken Korper,** Von S. L. Brug.

Archiv fur Schiffs—und Tropen-Hygiene, begrundet von C. Mense.

Streptococcus equinus Septicaemia in the Anglo-Egyptian Sudan, by Alberet J. Chalmers, M. D., F. R. C. S., D. P. H., and **George Haddad M. D.**

Dr. John Hall—Shakespeare's Son-in-Law, by Walter Lindley, M. D.

Pathogenic "Faecalis" Streptococci in the Anglo-Egyptian Sudan by Albert J. Chalmers, M. D., D. P .H., and Alexander Marshall.

A Note on Vaccine Treatment in Streptococcal Puerperal Fever, by Albert J. Chalmers, M. D. D. P. H., and Captain O'Farrell, R. A. M. C.

Cecal Stasis With Betaiminazolylethylamine (Histamin) Intoxication in Relation to Dementia Praecox; Indications for Treatment by Bayard Holmes, M. D.

Dementia Precox Studies, by Bayard Holmes, M. D., and Julius Retinger, Ph. D.

Contribucion al Estudio de los Germenes Patogenos del Agua, by Dr. Juan Iturbe and Dr. Eudoro Gonzales.

The Urine as a Prognostic Indicator in Puerperal Infection, by Theodore William Schaeffer, M. D.

The Control of Typhoid in the Army by Vaccination, by Major F. F. Russell, M. D., U. S. A.

Hay Fever: Its Cause and Prevention, by William Scheppegrell, M. D.

Proctitis and Pruritis Ani, as discovered by Dr. Alcinous B. Jamison.

Commercial Production of Thymol from Horsemint (Monarda Punctata). By S. C. Hood, United States Department of Agriculture.

Report of the Director of Sanitation of Porto Rico for 1915.

MISCELLANEOUS:

Medical and Surgical Reports of the Episcopal Hospital Hospital in Philadelphia. Volume III. (Press of Wm. J. Dornan, Philadelphia, 1915).

The Anti-Prohibition Manual. (National Wholesale Liquor Dealers' Association of America, Cincinnati, Ohio, 1916).

The Sanitary Progress and Vital Statistics of Hawaii. (Prudential Press, Newark, N. J., 1916).

Jubilee Souvenir. (Parke Davis and Company, Detroit, Michigan, 1916).

Saving the Sight of Babies. (National Committee for the Prevention of Blindness, New York City, 1916).

The Meaning of War and the Basis for Permanent Peace, by James W. Johnson. (Lewis R. Kantner Press, New York, 1916).

Second Annual Report of the International Health Commission of the Rockefeller Foundation. (Offices of the Commission, 61 Broadway, N. Y., 1916).

Transactions of the Society of Tropical Medicine and Hygiene. July, 1916. (11 Chandos St., Cavendish Square, W., London, 1916).

REPRINTS

Great Men and How They Are Produced, by Casper L. Redfield.

Three Cases of Entamoeba Histolytica Infection Treated With Emetine Bismuth Iodide, by George C. Low, M. A., M. D. and Clifford Dobell, M. A.

Reports of the M and H. Laboratories Dealing With the Diseases Affecting the Troops in the Dardanelles, by Captains R. G. Archibald and G. Hadfield, R. A. M. C. and Lieutenants W. Logan and W. Campbell, R. A. M. C.

Preliminary Remarks Upon Epidemic Cerebrospinal Mengitis as Seen in the Anglo-Egyptian Sudan, by Albert J. Chalmers, M. D., F. R. C. S., D. P. H. and Captain W. R. O'Farrell, R. A. M. C.

MORTUARY REPORT OF NEW ORLEANS.
Computed from the Monthly Report of the Board of Health of the City of New Orleans, for September, 1916.

Cause.	White	Colored	Total
Typhoid Fever	5	2	7
Intermittent Fever (Malarial Cachexia)	3	2	5
Smallpox	.....	.....	....
Measles	1	.....	1
Scarlet Fever	.....	.....	....
Whooping Cough	1	.....	1
Diphtheria and Croup	1	2	3
Influenza	.....	.....	....
Cholera Nostras	.....	.....	....
Pyemia and Septicemia	.....	.....	....
Tuberculosis	34	41	75
Cancer	19	9	28
Rheumatism and Gout	1	3	4
Diabetes	2	2	4
Alcoholism	4	.....	4
Encephalitis and Meningitis	2	1	3
Locomotor Ataxia	1	.....	1
Congestion, Hemorrhage and Softening of Brain	10	7	17
Paralysis	1	1	2
Convulsions of Infancy	.....	.....	....
Other Diseases of Infancy	.....	.....	....
Tetanus	.....	2	2
Other Nervous Diseases	5	1	6
Heart Diseases	44	39	83
Bronchitis	1	2	3
Pneumonia and Broncho-Pneumonia	13	12	25
Other Respiratory Diseases	1	1	2
Ulcer of Stomach	.....	1	1
Other Diseases of the Stomach	2	1	3
Diarrhea, Dysentery and Enteritis	13	7	20
Hernia, Intestinal Obstruction	3	1	4
Cirrhosis of Liver	4	7	11
Other Diseases of the Liver	5	4	9
Simple Peritonitis	.....	.....	....
Appendicitis	3	.....	3
Bright's Disease	15	14	29
Other Genito-Urinary Diseases	18	13	31
Puerperal Diseases	2	1	3
Senile Debility	.....	.....	....
Suicide	2	1	3
Injuries	22	20	42
All Other Causes	37	21	58
Total	275	218	493

Still-born Children—White, 20; colored, 26; total, 46.

Population of City (estimated)—White, 276,000; colored, 102.-000; total, 378,000.

Death Rate per 1000 per annum for Month—White, 11.96; colored, 25.65; total, 15.65. Non-residents excluded, 13.78.

METEOROLOGIC SUMMARY. (U. S. Weather Bureau.)

Mean atmospheric pressure 30.00
Mean temperature ..... 79.
Total precipitation ..... 3.13 inches
Prevailing direction of wind, northeast.